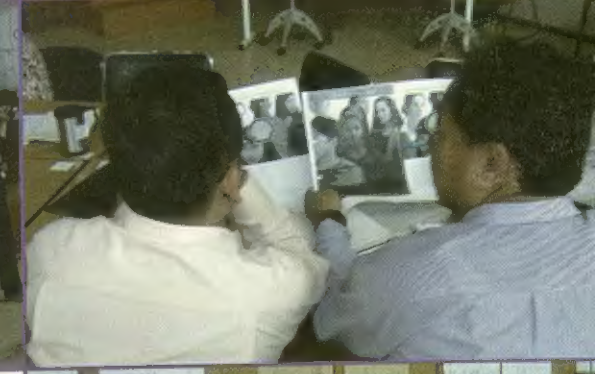
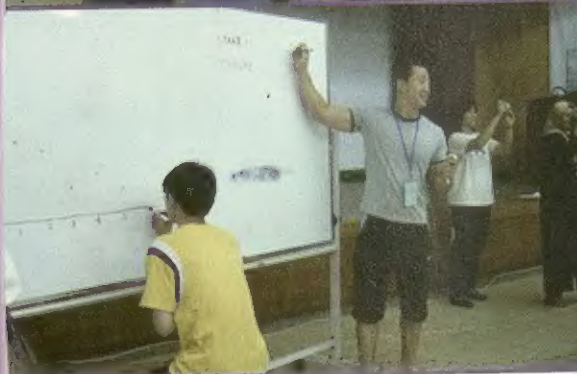
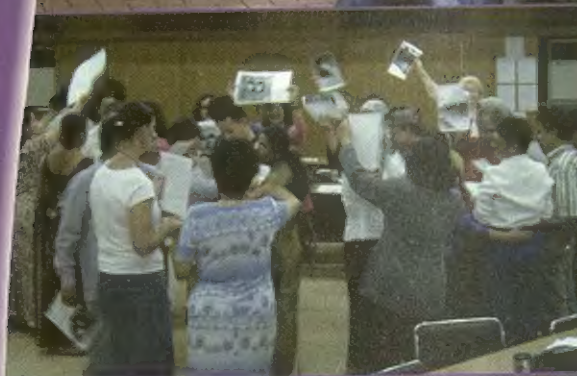


235

235/Gift



A National Review of Environmental Education and its Contribution to Sustainability in Australia

Further & Higher Education

295/Gibt

250

This report is Volume 5 in a five part series that reviews Environmental Education and its contribution to sustainability in Australia. The research which underpins it was undertaken between July and September 2004 by the Australian Research Institute in Education for Sustainability (ARIES) for the Australian Government Department of the Environment and Heritage. This series is titled '*A National Review of Environmental Education and its Contribution to Sustainability*' and covers the following areas:

Volume 1: Frameworks for Sustainability

Volume 2: School Education

Volume 3: Community Education

Volume 4: Business and Industry Education

Volume 5: Further and Higher Education

This volume is the first national review of the status of further and higher education undertaken in Australia and one of few attempts to capture needs and opportunities in this area. It provides a snapshot of the current context and identifies a number of key themes, which assist in constructing a picture of Environmental Education experiences in the further and higher education sector. The document provides analysis as well as recommendations to improve sustainability practice through Environmental Education.

Disclaimer: *The views expressed herein are not necessarily the views of the Australian Government, and the Government does not accept responsibility for any information or advice contained herein.*

Copyright: © 2005 Australian Government Department of the Environment and Heritage and Australian Research Institute in Education for Sustainability

Citation: Tilbury, D., Keogh, A., Leighton, A. and Kent, J. (2005) *A National Review of Environmental Education and its Contribution to Sustainability in Australia: Further and Higher Education*. Canberra: Australian Government Department of the Environment and Heritage and Australian Research Institute in Education for Sustainability (ARIES).

ISBN: 1 86408 996 2

Executive Summary: Available for download from <http://www.aries.mq.edu.au>

PDF Version: Available for download from <http://www.aries.mq.edu.au>



Acknowledgements

This report is based on research which was framed and directed by Daniella Tilbury, Macquarie University, Sydney.

Many Environmental Education thinkers and experienced practitioners have contributed to this research document. We are grateful to them for their input.

The principal authors were Daniella Tilbury, Amanda Keogh, Amy Leighton and Jenny Kent. Kristen Hebert and Kristina Cooke have also contributed to this document.

The research was peer reviewed to assure validity of findings. Damon Anderson (Senior Lecturer, Centre for Work and Learning Studies, Monash University who has expertise in VET issues), Peter Blaze Corcoran (University Leaders for a Sustainable Future and Professor of Environmental Studies and Environmental Education, Florida Gulf Coast University), Linda Condon (Head of the National Centre for Sustainability, Swinburne University who has expertise in VET issues), Julian Newman (Sustainability Director, Yale University), Dory Russell (Regional Education Officer: Grampians Regional Waste Management Group, Victoria who has expertise in VET issues) and Ros Taplin (Coordinator Environmental Management Program, Macquarie University) acted as key informants for this review. We are also grateful to the National Environmental Education Council (NEEC) and its Further and Higher Education Working Group for feedback on initial drafts.



Access 16004

Contents

Abbreviations	iv
5.1 Overview of EE in Further and Higher Education	1
5.2 The EE Experience in Further and Higher Education: From Principles to Practice	7
i) Learning from Greening the Campus	8
ii) Learning for Sustainability in the Curriculum	14
iii) Declarations of Commitment to Sustainability	19
iv) Institutional Learning for Change	23
v) The Changing Nature of Work	28
vi) Generic Skills	31
vii) Competency Based Training	35
5.3 Summary of Needs and Recommendations	39
Endnotes	42
References	46
Glossary	57

Abbreviations

ACCI	Australian Chamber of Commerce and Industry	ITAB	Industry Training Advisory Board
ACTS	Australian Campuses Towards Sustainability	LCA	Life Cycle Analysis
ACTU	Australian Council of Trade Unions	LSDA	Learning and Skills Development Agency
AGSM	Australian Graduate School of Management	MBA	Master of Business Administration
AIG	Australian Industry Group	NCVER	National Centre for Vocational Education Research
ANTA	Australian National Training Authority	NEEC	National Environmental Education Council
ANU	Australian National University	NSW CEE	New South Wales Council on Environmental Education
AQF	Australian Qualifications Framework	NTF	National Training Framework
AQTF	Australian Quality Training Framework	OECD	Organisation for Economic Co-operation and Development
ARC	Australian Research Council	OH&S	Occupational Health and Safety
ARIES	Australian Research Institute in Education for Sustainability	RMIT	Royal Melbourne Institute of Technology
AUQA	Australian Universities Quality Agency	RTO	Registered Training Organisation
BCA	Business Council of Australia	SDEP	Sustainable Development Education Panel
CLM	Conservation and Land Management	SEAV	Sustainable Energy Authority Victoria
DEH	Australian Government Department of the Environment and Heritage	TAFE	Technical And Further Education
DeSeCo	Definition and Selection of Competencies	TEFMA	Tertiary Education Facilities Management Association
DEST	Australian Government Department of Education, Science and Technology	TVET	Technical and Vocational Education and Training
DVC	Deputy Vice Chancellor	UAED	Universities of Australia Ecological Development
EE	Environmental Education	ULSF	University Leaders for a Sustainable Future
EMS	Environmental Management System	UN	United Nations
GHESP	Global Higher Education for Sustainability Partnership	UNESCO	United Nations Educational Scientific and Cultural Organisation
GRI	Global Reporting Initiative	UNSW	University of New South Wales
HEPS	Higher Education Partnership for Sustainability	UTS	University of Technology Sydney
IAU	International Association of Universities	UWS	University of Western Sydney
ICT	Information Communication Technology	VET	Vocational Education and Training
ILO	International Labor Organisation		
ISC	Industry Skills Council		

5.1 Overview of EE in Further and Higher Education

With the *United Nations Decade of Education for Sustainable Development (2005-2014)* having commenced, all countries are being encouraged to take progressive steps to integrate sustainability into education plans at all levels and across all sectors. Environmental Education (EE) can provide an important basis to reflect, learn and change towards sustainability. Creating opportunities for EE within the further and higher education curricula, however, is one of the biggest challenges.

Change towards sustainability in this sector requires more than just rethinking education plans or curricula. Ultimately, learning for sustainability has implications for the core of the institutional culture, influencing the decisions, management procedures and research actions of the further and higher education sector (see Boxes 5.1 and 5.2). The large scale changes required may explain the struggle this sector has experienced in engaging with sustainability. Instead it has focused on undertaking sustainability research for changing community thinking and practice rather than changing itself.

A handful of initiatives do exist in Australian further and higher education institutions¹ but these focus on single projects to address sustainability, as opposed to taking a more systemic view of learning and change across the institution. Some projects have taken the form of initiatives to 'green' the campus which include environmental management and awareness raising programs and

target issues such as water conservation, energy efficiency and waste reduction². As a result of these and other projects, environmental and sustainability concepts are making their way into some courses and training packages. In addition, some leading institutions have illustrated their commitment to sustainability by signing agreements, such as the Talloires Declaration³ and the Australian Ecological Development Charter⁴ (see Box 5.3).

The broader notion of sustainability has only recently come to the forefront of campus management, with the most innovative universities establishing sustainability policies. This has resulted in a further broadening of focus to include programs such as alternative transport programs¹⁰, sustainable campus programs¹¹ and green purchasing protocols¹². While this is evidence that universities are improving their environmental performance, generally they have not used an approach that addresses sustainability in an integrated fashion. For education institutions to more deeply address sustainability there is a need to link campus management to research, curriculum and administrative practice, such that sustainability is embedded across every aspect of institutional operations in a synergistic way.

■ Box 5.1

Challenges of Sustainability

'The crisis we face is first and foremost one of the mind, perception, and values; hence, it is a challenge to those institutions presuming to shape minds, perceptions, and values.'

Orr (1994, p.27)

'One of the great challenges of the 21st century for institutions of higher education is training professionals who are critical of the present-day development of our society and capable of acting in favour of more sustainable development. Therefore, universities have to work from all perspectives... to promote teaching and research programmes that provide solutions to the present problem.'

Geli De Ciurana (2001, p.3)

■ Box 5.2

Today Shapes Tomorrow

'The foundations of sustainable development are built on the way we think, the values we hold and the decisions we make. It cannot depend on just the technology available to us, the nature of our environment, or the policy instruments at our disposal. A public which is educated about the need for sustainable development is essential to achieving sustainable development.'

Department of the Environment and Heritage (1999, p.25)

■ Box 5.3 Sustainability Commitments

Australian universities and colleges exhibit varying levels of commitment to sustainability, which can be categorised as follows:

1. *Signing Declarations and Charters*

Several universities have signed agreements committing to change for sustainability⁵. These declarations demonstrate an 'in principle' commitment, which are yet to be put into practice.

2. *'Greening the Campus'*

Greening the campus through environmental management systems and awareness-raising programs are common features at this level of commitment. However these initiatives rarely address sustainability issues (eg, sustainable consumption) within the campus, or are resourced and supported to their full potential.

3. *Curriculum Innovation vs Integration*

Some universities and colleges are taking steps to integrate environmental and sustainability content into the existing curriculum⁶. However, learning for sustainability requires a fundamental change, not only in what we learn, but how we learn it⁷. It calls for curriculum innovation rather than integration. This requires the professional development of teaching staff.

4. *Institutional Change*

Whole-of-institution change for sustainability in the further and higher education sector is rare⁸. It encompasses professional, curriculum and organisational development engaging every dimension of the university or college in change for sustainability⁹.

The commitments outlined above are explored in greater details within this volume. Examples of good practice at each level are documented

■ Box 5.4 International Teacher Education Initiatives in Learning for Sustainability

In 1992, the Rio de Janeiro 'Earth Summit' called for formal education to reorient towards sustainable development. Although higher education has received some attention, the major focus has been on teacher education initiatives and resources¹⁵. Key initiatives to promote learning for sustainability approaches to teacher education include:

- 'The Environmental Educators' Initiative for China' is a joint initiative of WWF China, BP China and the Ministry for Basic Education. This initiative is a professional development program for teacher educators and lecturers which is supported by a network and resource centres¹⁶.
- The New Zealand Ministry of Education's 'Environmental Education Professional Development Program', is a national teacher education program that has trained over 40 teacher educators to provide in-service training for teachers throughout the country¹⁷.
- The online and CD-ROM based multimedia teacher education program, 'Teaching and Learning for a Sustainable Future'¹⁸ was developed by UNESCO and Griffith University as a demonstration project for adaptation and translation to suit local educational and cultural contexts¹⁹.
- The online and CD-Rom - 'Sustainability and Education' assists tertiary educators in incorporating sustainability into teaching and learning. This has been developed by Swinburne University's National Centre for Sustainability²⁰.

Also see Volume 1 of this series for further information.

Whilst the approach taken to integrate sustainability into further and higher education institutions would vary from campus to campus, a sustainable institution can be identified if it displays the following critical dimensions:

- mission statement expressing ongoing commitments to sustainability;
- concepts and practices of sustainability are incorporated into *all* academic disciplines (including teaching, professional development and faculty and student research);
- there is a conscious recognition of the role the institution plays in its social and ecological systems;
- knowledge of sustainability is a critical concern in the hiring, tenure and promotional systems;
- sustainable policies and practices are adhered to for operations, building and site management; and
- institutional support and services are present that support the social capital of the staff and students as well supporting the sustainability functions of the university.

Creating the fundamental changes that are needed to promote and address sustainability issues within an institution as a whole is a complex and ambitious task, which may explain why few institutions in this sector are addressing sustainability in a comprehensive way. Some argue that addressing the core institutional culture is critical to reorienting the further and higher education sector towards sustainability¹⁴. Encouragingly, it can be seen that current initiatives are making inroads within a sector which is sometimes

renowned for its reluctance to follow social trends.

Multiplier Effect

Further and higher education institutions play an important role not only in shaping the way we think, but also in educating the next generation of decision-makers, such as business leaders and government executives. They are also critical as they are the main training centres of key multipliers such as educators and the core of the teaching profession itself.

It is estimated there are 60 million teachers in the world, and the majority have been trained through higher education²¹. Universities have huge potential to reorient the formal education sector, and wider society in turn, towards sustainability. They create teacher education curriculum, train new teachers and provide professional development for practicing teachers²² (see Volume 2 of this series²³). However, presently there are limited opportunities for teachers to learn for sustainability. Some progressive international organisations and governments are attempting to address this need²⁴ (see Box 5.4).

Learning for sustainability approaches to EE in further education also have the potential to catalyse change in other community, industry and business sectors. Educating workers at para-professional, technical and trade levels for sustainability through Vocational Education and Training (VET) represents a major opportunity.

Australian Government Policy

National and state policies inform the sustainability agenda in the further and higher education sector. Key policy documents illustrate the increasing priority afforded to sustainability by the Australian governments at federal and state levels. These policies include

the 'National Strategy for Ecologically Sustainable Development'²⁵, the 'National Action Plan for Environmental Education for a Sustainable Future'²⁶, and more recently, state sustainability strategy documents such as Western Australia's 'Hope for the Future'²⁷ and Victoria's 'Our Environment, Our Future'²⁸. These strategies provide a framework for a range of other government policies and guide government efforts and expenditure in sustainability and education which supports it.

Where state-wide Environmental Education plans, policies and statements exist, they tend to focus more strongly on primary and secondary education, with little attention paid to further and higher education. However, the New South Wales EE plan 'Learning for Sustainability'²⁹ does outline specific actions for VET providers and tertiary education institutions, although these are not mandatory and are adhered to on a voluntary basis (see Box 5.5)

It is the Australian Government Department of Education, Science and Training (DEST) that administers Australia's higher education policy. The Australian National Training Authority (ANTA)³⁰, a national statutory body, provides strategic direction and a framework for the policies and operations of VET (see Box 5.8). It's national strategy 'Shaping our Future'³¹ establishes a vision and the long term goals for further education and specifically identifies the contribution of VET to sustainable communities³² (see Box 5.6).

DEST has identified sustainability as a priority for research³³. Much of the research in sustainability is often carried out by the Collaborative Research Centres, some of which have education and communication

■ Box 5.5

Learning for Sustainability

The NSW learning for sustainability strategy outlines actions for VET providers and universities.

Action 38 'VET providers are to be encouraged to include relevant environmental content in the courses and programs they offer.'

NSW Government (2002, p.36)

Action44 'NSW Universities are to be encouraged to expand the number of places available in environmental education courses and make environmental electives readily accessible to those in other programs.'

NSW Government (2002, p.38)

■ Box 5.6

Shaping the Future of VET

'Shaping our Future: Australia's National Strategy for Vocational Education and Training 2004-2010'³⁵ establishes long-term objectives for the VET system. It is developed by the Australian National Training Authority, the national statutory body established to provide a framework for all VET providers. The vision of the national strategy is:

- 'VET works for Australian businesses making businesses internationally competitive;
- VET works for people giving Australia world-class skills and knowledge; and
- VET works for communities building inclusive and sustainable communities.'

ANTA (2004, p.1)

■ Box 5.7 Key Stakeholders in Higher Education

Higher Education incorporates universities throughout Australia, which are established or recognised under State or Territory legislation.

- The Australian Government Department of Education, Science and Training (DEST) is the primary funding body for higher education³⁸. Universities are increasingly seeking funds from other sources, including business and industry, the wider community and overseas interests.
- The formal governing of each Australian university is undertaken by the Council, Senate or Board of Governors, presided over by a Chancellor elected by the members of the governing body. Sectors represented include government, industry, the wider community, academic staff, graduates and students.
- The chief executive authority rests with the Vice-Chancellor, who is accountable to the Council, Senate or Board of Governors and is responsible for the academic and administrative operation of the institution.
- In most Australian universities, the Vice-Chancellor is supported by three or four Deputy Vice-Chancellors (DVC). Each DVC is responsible for one of the core operations of universities; teaching, research and administration. Often, management of campus operations and internationalisation also forms part of their portfolios.

Australian Universities are responsible for maintaining the quality of their own academic standards, which is independently verified every five years by the Australian Universities Quality Agency.

Australian Universities Quality Agency (AUQA)³⁹

AUQA operates independently of governments and the higher education institutions under the direction of a Board of Directors. AUQA is responsible for:

- Conducting quality audits of self-accrediting Australian higher education institutions and State and Territory Government higher education accreditation authorities on a five yearly cycle;
- Providing public reports on the outcomes of these audits;
- Commenting on the criteria for the recognition of new universities and accreditation of non-university higher education awards, as a result of information obtained during the audits of institutions; and
- Reporting on the relative standards and international standing of the Australian higher education system and its quality assurance processes, as a result of information obtained during the audit process.

programs. These are opportunities to broaden learning for sustainability approaches.

Ultimately, governance of universities rests at the state level³⁴ and this has important implications for how sustainability is pursued. In practice, the degree of state involvement in institutional policy is minimal. Universities operate on an autonomous basis and develop their own policies and objectives. VET differs in that the state and governments align their own VET policy and funding arrangements with a national strategy and financial agreements are negotiated with a national statutory body - the Australian National Training Authority (ANTA). ANTA responsibilities will be subsumed within the Australian Government Department of Education, Science and Technology after July 2008 (see Box 5.8).

Stakeholders in Decision-Making
Further and higher education both have distinctly different governance structures. There are also different stakeholder groups aligned with these structures (see Boxes 5.7 and 5.8). In addition to this, each institution will have its own management frameworks for their numerous staff members.

The complexity of these institutional arrangements makes change for sustainability problematic. For even less challenging issues, decisions must follow the established bureaucratic procedure.

Furthermore, some argue that the resolution of sustainability issues requires a broader process of stakeholder engagement³⁶. Other stakeholders such as

student associations, professional organisations, industry and employers, as well as the wider community stakeholders need to be involved to inform changes for sustainability³⁷. These factors make for lengthy, complex decision-making processes and can cause problems in implementing change for sustainability.

International Developments in Learning for Sustainability
Internationally, sustainability is becoming an integral part of forward-looking higher education institutions and many institutions are linking learning and innovation to sustainability³⁸. This is reflected by over 1,000 university leaders, presidents and vice-chancellors signing agreements⁴⁴ that commit their institutions to change towards sustainability. International organisations and initiatives, such as University Leaders for a Sustainable Future, International Association of Universities and the Global Higher Education for Sustainability Partnership reflect the growing interest and activity in this area (see Box 5.9).

The experiences of the last 15 years have shown that signing sustainability charters, involvement in efforts to 'green' the campus or curriculum will not necessarily lead to change towards sustainability. While innovative individuals and groups working in the local context can achieve changes towards sustainability, real and lasting achievements for sustainability are dependent on successful cultural change across the whole of the institution⁴⁵.

On the international stage, there are a number of government-led initiatives focusing on innovation,

■ Box 5.8 Key Stakeholders in Vocational Education and Training

Vocational education and training (VET) is the largest provider of post-compulsory education in Australia⁴⁰. The bulk of VET programs are delivered by Technical and Further Education (TAFE) institutes, in addition to Adult and Community Education providers and private registered training organisations.

Australian National Training Authority
ANTA is the national government statutory authority charged with providing the strategic policy and financial framework for vocational education and training. ANTA reports to a Board, which consists of 4 industry representatives. This Board advises the Ministerial Council (MINCO) of Australian Government, state and territory Ministers responsible for vocational education and training on:

- National VET Policy, strategy, priorities, goals and objectives nationally; and
- VET plans, which states and territories develop each year. These plans detail how national priorities, goals and objectives will be met.

One of ANTA's key roles is the development, management and promotion of the National Training Framework (NTF) administered by state and territory training authorities.

- The NTF includes Training Packages, the Australian Qualifications Framework (AQF) and the Australian Quality Training Framework (AQTF), a set of nationally agreed standards for assuring the quality of VET services nationwide; and
- Training organisations must be registered under the AQTF in order to deliver, assess and issue Australian Qualifications Framework (AQF) qualifications.

From July 2005, the role and responsibilities of ANTA will be subsumed by the Australian Government Department of Education, Science, and Training.

Industry Training Advisory Boards
Industry Training Advisory Boards (ITABs) are national and state industry bodies that provide information to government on industry training demand. At present, Industry Skills Councils are progressively replacing ITABs at the National level.

Industry Skills Councils
ANTA is in the process of establishing ten Industry Skills Councils which will have two main purposes.

- To provide accurate industry intelligence to VET regarding current and future skill needs and training requirements.
- To support the development, implementation and continuous improvement of quality, nationally recognised training products and services.

To date, eight Industry Skills Councils have been announced to focus on a range of skill areas: Agri-Food; Community Services and Health; Construction and Property Services; ElectroComms and Energy/Utilities; Innovation and Business; Resources and Infrastructure; Services; and Transport and Logistics⁴¹.

Industry Associations
ANTA identifies four key industry associations, which have direct input into their VET framework:

- Australian Chamber of Commerce and Industry (ACCI);
- Australian Council of Trade Unions (ACTU);
- Australian Industry Group (AIG);
- Business Council of Australia (BCA).

State and Territory Training Governments
Although ANTA provides the broad strategic direction for VET, state and territory governments remain the largest funders of VET and (via their respective training authorities) set state-wide policy and planning priorities and allocate funding to RTOs via profile agreements and contracts, within the context of annual VET plans negotiated with ANTA.

■ Box 5.9 Global Higher Education for Sustainability Partnership (GHESP)

Networking and partnerships have proven to be successful in sharing examples and lessons of good practice and promoting their adoption within other programs. The GHESP is a prime example of networking and information sharing at the international scale.

The objectives of the GHESP include⁴²:

- To promote better understanding and more effective implementation of strategies for the incorporation of sustainability within higher education institutions;
- To undertake a global review and assessment of progress in making sustainability a key focus of curriculum, research, outreach and operations of higher education institutions; and
- To identify and share effective strategies, models and best practices for promoting higher education learning for sustainability.

■ Box 5.10 International Higher Education Initiatives in Learning for Sustainability

UK Sustainable Development Education Panel and Higher Education Partnership for Sustainability

The UK Department of the Environment, Transport and Regions formed the Sustainable Development Education Panel to consider education for sustainability issues and make recommendations to government for change across multiple sectors⁴⁶. The Panel has set a goal that by 2010 all UK further and higher education institutions will have staff fully trained in sustainability and provide relevant learning opportunities to students. The Panel has also established the Higher Education Partnership for Sustainability (HEPS) initiative, which encourages collaboration between institutions engaging with sustainability.

New Zealand Tertiary Education Strategy

This Strategy was released by the NZ Government in 2002 and sets the overall direction for higher education. The strategy includes six national development objectives, including sustainability. The need for relevant research and the development of skills to enable all New Zealanders to address sustainability issues is identified as a critical priority⁴⁷.

South African Environmental Learning Across National Qualifications Framework

The South African Framework was produced by the National Government in 2001 to provide guidance to a range of education institutions. It is an open-ended Qualifications Framework, which embraces a broader view of environmental learning to incorporate not only the biophysical but also the cultural and aesthetic aspects of the human environment. The Framework emphasises that environmental learning should be addressed in the development of all standards and qualifications, including those of further and higher education⁴⁸.

mostly in higher education learning for sustainability (Box 5.10). These initiatives offer insightful examples to the Australian sector regarding steps that it can take to progress learning for sustainability.

2 The EE Experience in Further and Higher Education: From Principles to Practice

While much has been written regarding EE and sustainability in higher education, the body of knowledge relating to further education is less well developed. However, both elements of this sector demonstrate low levels of engagement with learning for sustainability in practice.

Understandings of the term 'sustainability' and 'learning for sustainability' vary considerably across further and higher education for highlighting that these are different concepts and that there are no common agreed goals. It has been recognized that there is a need for 'critical reflection' and discussion of the concept particularly with regard to its relationship to, and implications for, participants and stakeholders in Vocational Education and Training (VET)⁴⁹. The development of shared understandings and consistent approaches is also required in the further and higher education sector.

This document provides a snapshot of the current context and documents the EE experience in further and higher education. A number of key themes

are identified to assist in constructing a picture of current approaches to sustainability in this sector and needs for moving forward. Although all themes are relevant across the further and higher education sector, the initial four themes of this document give a bias to University examples as these are well documented. The final three themes, which are of greater relevance to VET, provide examples and expand upon issues relating specifically to further education. All the themes are inextricably linked and need to be read in conjunction⁵⁰:

- i) Learning from Greening the Campus;
- ii) Learning for Sustainability in the Curriculum;
- iii) Declarations of Commitment to Sustainability;
- iv) Institutional Learning for Change;
- v) The Changing Nature of Work;
- vi) Generic Skills; and
- vii) Competency Based Training.

i) Learning from Greening the Campus

■ Box 5.11

Australian Examples of 'Greening the Campus' Initiatives

Tree Planting

With the help of community groups, Newcastle University facilities management staff have replanted a large portion of the Callaghan Campus⁵⁶.

Waste Recycling

ANU runs a waste program that recycles a number of products, including paper, cardboard, commingled glass and plastic, computers, and construction waste⁵⁷.

Water Recycling and Retention

In 2001, Monash University introduced an irrigation water recycling scheme for their hockey fields. Irrigation run off water is captured at the edges of the field and redirected into a storage tank to be re-used for irrigation when required⁵⁸.

Stormwater Management

ANU has established a stormwater management scheme by installing sediment traps in areas identified as posing the most risk to the environment⁵⁹.

Energy and Greenhouse Gas Emission Reduction

A number of universities across Australia have implemented the Green Office energy reduction program. This involves campaigns to reduce energy consumption and reduce waste production. Monash University⁶⁰ originally implemented this program in 2000 and a number of other universities have followed suit, including UNSW⁶¹, ANU⁶² and Melbourne University⁶³.

Awareness Raising Campaigns

UNSWitch is an energy efficiency awareness raising campaign at UNSW. This campaign encourages staff and students to reduce their energy consumption by switching off computers, lighting and heating when not in use⁶⁴.

Sustainability in practice has been interpreted by many in Australian universities and VET institutions as 'greening the campus'. Sustainability initiatives focus on improving the environmental performance of campus operations⁵¹ which consist of reorienting practices within buildings and grounds so as to reduce environmental impact and minimise operational costs (see Box 5.11). In order to achieve this many universities and some VET institutions have adopted environmental management systems⁵²; engaged in 'ecological foot-printing'⁵³ and 'eco-auditing'⁵⁴ exercises and/or implemented environmental awareness raising programs⁵⁵ amongst staff and students.

The literature on learning for sustainability approaches to education specifically advocates the linking of campus greening initiatives to curriculum change for sustainability⁶⁵. The advantage of linking greening initiatives and curriculum change is that it allows for both a practical and conceptual understanding of learning for sustainability approaches for students and staff. This linkage has been demonstrated as being easily integrated through the observations of Ian Thomas at RMIT⁶⁶. A handful of Australian universities are beginning to adopt a more holistic approach and are making the connection between campus, administration and curriculum change. However, much work remains to embed learning for sustainability approaches to Environmental Education across the whole of institutions (see Box 5.12). The reality is that further and higher

education institutions are only beginning to wrestle with the challenges of sustainability in the campus

Approaches to Campus Greening

Campus greening programs began in the 1960s and 1970s originally based on small-scale initiatives - the creation of clean, green spaces within the campus being one example. Environmental concepts such as water conservation were later addressed, followed by the establishment of a broad range of programs addressing issues such as waste recycling⁶⁷, stormwater management⁶⁸, energy use and greenhouse gas reduction programs⁶⁹ (see Box 5.11).

More recently, environmental management systems (EMS) have been established and technical procedures such as eco-auditing⁷⁰ have been conducted to assess environmental impact. Ecological foot-printing is also increasingly being adopted⁷¹. Using a broader approach than environmental auditing, ecological foot-printing deals with sustainability concepts. It extends environmental assessment to encompass the total impacts of the products and services used by universities and colleges⁷².

These most recent approaches to campus greening are characterised by the use of environmental management tools and measures to enhance the environmental performance of campus operations. There is a broad range of such tools available for this purpose (see Table 5.1). Many of them focus on increasing the resource efficiency

Table 5.1
Tools for Greening the Campus
(adapted from TEFMA (2004, unpublished))

Tool Type	Description of Tools Available
Building Rating Tool	<ul style="list-style-type: none"> ● <i>Green Star Environmental Rating System</i> developed by Green Building Council of Australia⁷⁶. ● <i>Australian Building Greenhouse Rating</i> provides a national approach to benchmarking the greenhouse performance of buildings and tenancies⁷⁷. ● <i>Green Globe 21</i> is a benchmarking and certification program based on Agenda 21⁷⁸. ● <i>National Australian Built Environment Rating System</i> is performance-based rating system developed by Australian Government Department of Environment and Heritage in consultation with industry and stakeholder groups⁷⁹. ● <i>Basix</i> is the Building Sustainability Index which is an assessment tool used by development applicants to make sure new homes meet the NSW Government's standards⁸⁰.
Management and Reporting Systems	<p>Management Systems and Certification Schemes provide a framework for identifying and managing risks and establish clear processes for planning, implementation and reviewing of performance⁸¹. These include:</p> <ul style="list-style-type: none"> ● <i>ISO 14001 Environmental Management System</i>. ● <i>ISO 9000 Quality Management Systems</i>. ● <i>AS4801 Occupational Health and Safety Management System</i>. <p>Accountability and Reporting Frameworks include:</p> <ul style="list-style-type: none"> ● <i>Global Reporting Initiative (GRI)</i> is the most widely adopted reporting framework for measuring and reporting an organisation's environment, resource and social position⁸². ● <i>AccountAbility 1000 Series</i> was developed to complement the GRI by addressing the need for organisations to integrate their stakeholder engagement process into daily activities⁸³. ● Triple Bottom Line reporting.
Energy Management Tools	<ul style="list-style-type: none"> ● <i>CSIRO Energy Express</i>⁸⁴ - A Software Program to manage energy load designed for use by engineers and architects. ● <i>E-Bench</i>⁸⁵ A program to manage energy consumption. ● <i>Greenhouse Challenge Program</i>⁸⁶ is a program to reduce energy use.
Ecological Footprinting ⁸⁷	<ul style="list-style-type: none"> ● <i>The Eco-Footprint Calculator</i>⁸⁸ is a tool which individuals or organisations can use to calculate the size of their impact on the earth's resources.
Life Cycle Analysis Tools	<ul style="list-style-type: none"> ● <i>LCAid</i> makes life cycle assessment information more accessible to other practitioners to make more complete environmental assessments⁸⁹. ● <i>LCA Design</i> developed by the CRC for Construction Innovation provides a database of environmental impact of building components and materials⁹⁰. ● <i>Sima Pro</i> is designed to collect, analyse and monitor the environmental performance of products and services⁹¹. ● <i>LISA (LCA in Sustainable Architecture)</i> identifies key environmental issues in construction and provides a tool for evaluating environmental aspects of building design⁹². ● <i>EcoSpecifier</i> is an extensive resource 'knowledge base' on products & materials, and provides knowledge and training on best practice sustainable materials and product specification and design⁹³.

■ Box 5.12 Barriers to Change

Barriers to change cover a broad range of issues which include a lack of interest and commitment towards sustainability initiatives; misconceptions or confusion about the topic of sustainability; a lack of reward or recognition for innovation and change; a lack of financial support for resources and training; and a lack of experience working across disciplines.

These and other barriers to change have been distilled down to three key areas:

- A lack of culture of value or priority given to greening and sustainability;
- A lack of organisational and resource support for staff; and
- A lack of training for academic staff.

Thomas (2004, p.39)

■ Box 5.13 Building Sustainability Workshop⁹⁵

TEFMA held a workshop at Macquarie University in July 2004. Its objective was to enhance the knowledge and capacity of facilities management staff to incorporate sustainability principles in campus management. The workshop provided an opportunity for tertiary facilities management staff to share their knowledge and experiences of sustainability initiatives.

■ Box 5.14 Criteria for Establishing Successful Sustainability Initiatives⁹⁸

- Build positive relationships with stakeholders;
- Obtain institutional commitment - financial support, staff time, information access, public statements of commitment and policy are crucial to a long-term strategy;
- Involve staff throughout all stages; and
- Maximise educational benefits by involving students.

of buildings through energy and water conservation. Some of the more advanced tools deal with the concept of life cycle analysis (LCA), which takes a more holistic view of environmental impacts. This represents a progression from 'reduce and reuse' measures towards addressing the need to 'redesign' more fundamentally, and can be utilised by universities as a more systemic approach.

Some universities and colleges complement environmental management programs with awareness raising campaigns targeted at staff and students⁷³. These campaigns are designed to provide information relating to the consequences of unsustainable behaviour in the hope that such information will lead to a change in behaviour in the target audience⁷⁴. However information alone is insufficient to enable lasting change (see Box 5.12). 'Critical reflection' on current unsustainable practice and capacity building for change is required to embed sustainability more deeply in institutional practice⁷⁵. An educational campaign supported by institutional commitment via policy, governance structure and an operational system, will more readily lead to the desired outcome of a sustainable campus.

Staff Development

Facilities management staff are usually given the responsibility for planning and implementing campus environmental management plans. Traditionally, staff have had little training in the environmental field, although more recently, new positions, such as environmental projects officer or sustainability coordinator, have been created in a number of universities⁹⁴. People employed in these roles develop and manage specific environmental projects aimed at improving the campus environment.

The Tertiary Education Facilities Management Association (TEFMA) is attempting to build the capacity of facilities staff to address sustainability. It is the peak university facilities management body in Australasia. TEFMA identifies sustainability as a key focus of work and actively aims to promote sustainability throughout the Australasian facilities management tertiary education sector⁹⁶. TEFMA held a workshop on 'Building Sustainability' in 2004 (see Box 5.13).

TEFMA are also developing resources to assist their members with sustainability in their roles. 'Guide to Incorporating Sustainability into Facilities Management'⁹⁷ assesses the environmental management tools that are available for performance measurement and enhancement. These tools are valuable mechanisms for assessing campus greening initiatives, however they do not broaden the scope of campus greening beyond environmental management concerns.

Andrew Nixon has reviewed the campus sustainability assessment process in a bid to provide a theoretical and practical basis for education institutions undertaking campus sustainability initiatives⁹⁹. He has identified a number of key criteria for establishing successful sustainability initiatives (see Box 5.14). This study addresses the broader notion of sustainability and emphasises the importance of a whole of institution approach that engages multiple stakeholders and maximises the potential these programs offer in learning for sustainability.

Engaging Stakeholders in Improving Practice

Academic and administrative staff, as well as students, need to play a part in moving education institutions towards

sustainability. Inclusive approaches ensure the benefit of embedding change in sustainability more deeply in every part of the institution's operations. They also increase the efficacy of sustainability programs. Engaging all stakeholders develops a broad base of ownership and support for change¹⁰².

In Australia there are a number of initiatives that involve both students and staff in enhancing environmental measures and reducing operational costs. Few of these programs, however, embrace the notion of sustainability including aspects of sustainable development (see Box 5.15).

Some initiatives adopt a collaborative approach to encourage stakeholder involvement and build a sense of shared responsibility in making environmental improvements. This practice is aligned with sustainability as advocated by the United Nations¹⁰³. Active student, staff and community participation has been successfully achieved in an auditing initiative of a progressive business university, Universidad Autónoma de Madrid (see Box 5.16). An interesting element of this program is its integration into the curriculum resulting in greater commitment to campus change and better qualified graduates¹⁰⁴. Multi-stakeholder participation in change programs such as this addresses an important principle of sustainability. The next challenge for such initiatives is to address sustainability in both the issues they address and the approach they take to resolving them.

Greening the Campus Supply Chain

A growing number of progressive institutions, such as Monash University, are asking their suppliers to improve their environmental practice¹⁰⁵. In this context, the supply chain includes a wide range of on-campus commercial services such

as catering, retail and recreational facilities. Independent providers run many of these campus services so the responsibility for their environmental practice does not fall under university or college management.

Campus services employ large numbers of staff, provide food and drink to a large portion of the university population everyday and produce significant amounts of waste. Macquarie University is taking steps to address this area and has recently worked with a sustainability consultant to improve the practice of its student recreation and catering services through a learning for sustainability approach (see Box 5.17).

More needs to be done to embed sustainability principles within campus commercial services. Sarah Hammond Creighton¹⁰⁷ identifies a wide range of actions that can be taken by on-campus service providers to aid the greening of the campus, including the selection and preparation of food and the handling of waste. She goes on to explore issues more closely aligned with the principles of sustainability, including the opportunity that on-campus food service providers have to improve health, reduce environmental impacts and educate students. She reinforces the need to engage and educate multiple stakeholder groups in order to embed sustainability more deeply in the practice of every aspect of higher education institutions¹⁰⁸.

Forming Collaborative Networks on Campus Greening

Increasing recognition of the sustainability agenda and the proliferation of campus greening programs in Australian universities has led to the development of networks intended to provide a forum for the exchange of universities' experiences. The establishment of collaborative

■ Box 5.15

Environmental Programs Engaging Staff and Students¹⁰⁰.

ANU Interhall Environmental Program

ANU has recently implemented an 'interhall' environmental program, which aims to provide non-formal education to hall residents to raise environmental awareness and green the halls' environment¹⁰¹.

These programs have been successful in building awareness for resource efficiency. This has resulted in incremental improvements in financial and environmental performance.

The next step will be to seek more profound changes in practice, which challenge unsustainable behaviour. This will require deeper, 'critical reflection' on professional and residential practice that would reveal the more systemic factors perpetuating unsustainable behaviour.

Green Office Program

This program encompasses a ten-point plan focusing on resource efficiency in campus offices. It has been implemented at a number of universities across Australia including ANU, UNSW, Monash and Sydney University.

■ Box 5.16

Environmental Management Plans

'The elaboration and achievement of environmental management plans need to be based on the involvement and active contribution of every person who works, studies and/or resides in this environment... Involvement can set in motion EE processes for those who take part in it. Direct intervention in decision-making and cooperation in every action becomes an educational process that tends to commit students and teachers to their centre's sustainable development.'

Calvo, Benayas & Gutierrez (2002, p.96)

■ Box 5.17

Business Planning as Learning for Sustainability

Students At Macquarie (SAM) is the recreation and service provider at Macquarie University, Sydney. SAM has a vision to establish:

'...a reputation of providing services of quality and relevance to the campus community, in an environmentally, socially and culturally responsible manner.'

Students at Macquarie (2003, p.1)

In 2003, SAM brought in a sustainability consultant to run a staff workshop in order to define sustainability in relation to their services and envision SAM's future direction. This EcoSteps workshop integrated the strategic planning process with a process of learning for sustainability and led to the development of a business plan based on the principles of sustainability¹⁰⁶.

■ Box 5.18

ACTS Objectives

ACTS members include environmental managers, facilities staff, academic staff and students representing nearly every university in Australia. The objectives of ACTS are to:

- Link individuals across Australian universities and TAFE who share the same environmental management imperatives;
- Share existing experience in best practice university environmental management and encourage the exchange, development and implementation of new initiatives to reduce the ecological footprint of Australian universities;
- Promote the integration of teaching, research and campus environmental management to create a synergy between environmental learning and the learning environment;
- Identify and develop national, state and other cross-university collaborative environmental management strategies, programs and projects.

ACTS (2004a)

learning networks is closely aligned with the principles of learning for sustainability as it offers opportunities for dialogue and partnership building, as well as sharing practical experiences¹⁰⁹.

Australian Campuses Towards Sustainability (ACTS) was established in 1997 to provide Australian universities and further education institutions the opportunity to share knowledge and expertise in the field of campus environmental management¹¹⁰. ACTS provides a knowledge-sharing forum for all staff, students and the wider community (see Box 5.18).

Incorporating collaborative learning workshops could enhance this valuable network and encourage participatory reflection on practice. This would not only share knowledge and experience across the network, but also promote continuous improvement in practice in line with learning for sustainability approaches.

Student Involvement

Students and student organisations are critical stakeholders in campus change for sustainability. These groups have been closely involved with putting pressure on education institutions to adopt and implement environmental management policies and practice. Most universities in Australia have a student organisation dedicated to some form of environmental activism¹¹¹. Student organisations can play an important role in creating environmental awareness amongst their fellow students, although they often have limited resources, a leadership and membership base in constant transition and no immediate access to university decision-making processes¹¹².

Student groups tend to become involved in short-term projects focussing on specific environmental management issues such as waste management

and water conservation, rather focussing on long-term sustainability oriented activities such as wider institutional change¹¹³. However, there have been some attempts at influencing decision-making regarding campus sustainability, such as the National Union of Students Sustainability Campaign (see Box 5.19).

Whilst these efforts seek to broaden the decision-making base in universities, their objective is still environmental improvement. The student body has yet to grapple with the full breadth and depth of sustainability concepts.

Towards Systemic Approaches
Some innovative projects are beginning to combine campus greening with curriculum improvements and building relationships with other stakeholders in the process. The 'Green Steps Program' was initiated by Monash University students in 1998 and has been rolled out to several other Australian Universities¹¹⁴. The objectives of the program are:

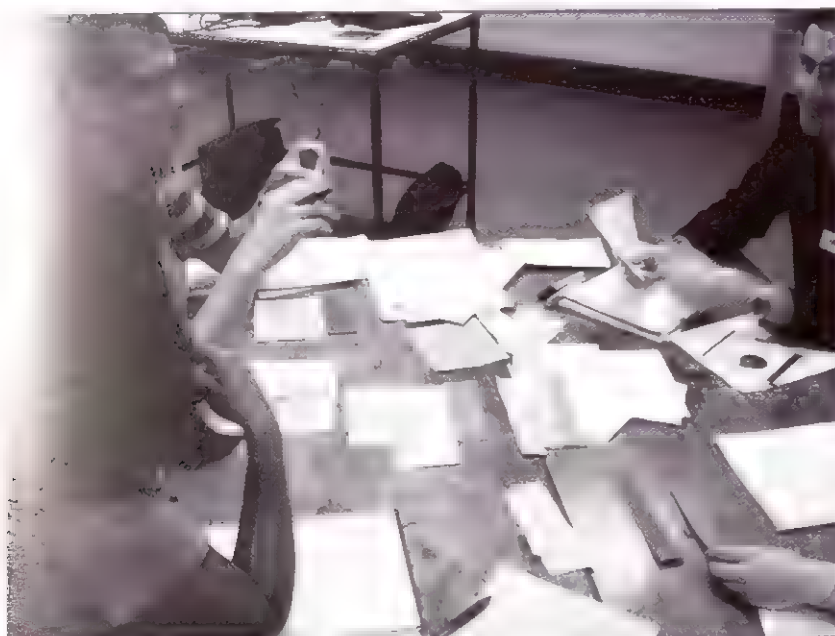
- To assist campus businesses to improve environmental practices;
- To provide environmental change management training and experience to university students;
- To assist the university in achieving its environmental objectives by implementing energy efficiency and waste minimisation strategies involving staff awareness and education;
- To provide a 'bridge' for university students between their studies and the environment industry through work experience and networking opportunities¹¹⁵.

Over the past 15 years campus greening has become common practice. This is evidenced by the number of further

her education institutions in programs to enhance their environmental performance¹²¹. There are few Australian campuses that offer recycling facilities, energy and water efficiency

A challenge for the further education sector is to ensure these efforts to address the issue of sustainability within management. Education institutions need to look beyond the

environmental impact of their activities to incorporate reflection on sustainable consumption and other economic and social themes which have an impact on environmental quality. Further, there is a need to consider change towards sustainability across not only campus management and operations, but also in the curriculum, through administrative practice and research activities¹²³. This is essentially a systemic process of institutional learning for change¹²⁴.



■ Box 5.19

The National Union of Students Sustainable Universities Campaign

This campaign was launched at UNSW to coincide with the annual National Union of Students Conference in September 2001¹¹⁹. The campaign aimed to reduce universities' drain on natural resources by cutting energy and water consumption and introducing recycling and waste management practices.

Each university was provided with a 'Sustainable Universities Information Resource' booklet, which outlined the benefits of a sustainable university, current environmental management approaches and best practice examples¹¹⁵. The key focus of this campaign was to lobby universities to improve environmental management¹¹⁶, by:

- Establishing environmental management systems to reach ISO 14001 standards;
- Employing an environmental officer and establishing an environment management committee; and
- Providing funding for environmental awareness campaigns.

The 'Sustainable Universities Information Resource' booklet briefly touches on 'greening the curriculum' across the university, but this only focuses on adding environmental issues to current curriculum, not the fundamental changes that accompany learning for sustainability.

Since the launch of the resource kit in 2001, this campaign has not been a key priority of NUS, but a campaign 'revival' is planned¹¹⁷.

ii) Learning for Sustainability in the Curriculum

■ Box 5.20 Infusing EE

'Despite its potential for transformation, EE at the university level is mostly interpreted as the infusion of environmental concepts into the curriculum'.

Calvo, Benayas & Gutierrez (2002, p.91)

■ Box 5.21 Talloires Declaration (extract)

'Universities have a major role in the education, research, policy formation and information exchange necessary (for sustainability). We, therefore, agree to take the following actions....

3. Establish programs to produce expertise in environmental management, sustainable economic development, population and related fields to ensure that all university graduates are environmentally literate and responsible citizens.
4. Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate and professional school students.'

University Leaders for a Sustainable Future (2004, p.1)

Providing learning opportunities for sustainability in the further and higher education curriculum is important if we are to empower and equip people for change towards sustainability¹²⁵. The education of the next generation of leaders and professionals represents a critical opportunity to address sustainability issues. The curriculum change needed to seize this opportunity requires staff development, the development of teaching and learning resources, and the revision of existing courses as well as the provision of new courses (see Box 5.20).

The Need for Curriculum Change
Internationally the further and higher education sector has acknowledged the importance of learning for sustainability through various declarations, the most significant of which is the Talloires Declaration¹²⁶, which was developed by University Leaders for a Sustainable Future in 1990. It includes a 10 point plan that commits Universities to curriculum change and professional development for sustainability (see Box 5.21).

This important document recognizes that curriculum change for sustainability is needed across all programs of study offered by higher education, and not just those programs focusing specifically on sustainability issues¹²⁷. This is because all sectors of society must be equipped to actively engage in change for sustainability¹²⁸. Curriculum change offers the opportunity to embed the principles of learning for sustainability such that all students can address sustainability

issues in their future professional roles¹²⁹. This needs to be done in two ways, through the revision of existing courses and development of new ones. New opportunities need to be created also for people who wish to receive training and education with a specialism in sustainability or learning for sustainability approaches within their chosen field.

Learning About and For Sustainability

In practice, the predominant trend in higher education curriculum initiatives has largely been towards learning *about* sustainability, which fosters environmental literacy amongst students and builds awareness of sustainability issues¹³⁰. Increasingly, courses introduce students to the sustainability literature and a variety of definitions and interpretations of this term. In this instance, learning is interpreted as a process that develops knowledge as opposed to a process of inquiry that engages and equips students for change towards sustainability¹³¹. The learning process needs to be taken to this next stage which equips students with the conceptual frameworks needed to help them develop the skills to effectively enact change towards sustainability.

A recent study into sustainability in the curriculum of Australian business schools shows that sustainability has been integrated as additional content into existing curricula¹³² (see Box 5.22). While there are no compulsory sustainability courses in postgraduate business education, environmental and

ility themes do feature in core and elective subjects. The approach has been to integrate sustainability knowledge into an existing curriculum.

Integration not Integration

Tilbury has argued that education, not integration is needed to enable curriculum change for sustainability¹³⁵. This is supported by Stephen Sterling's argument for a transformation of the learning experience if learning for sustainability approaches are to be used in higher education¹³⁶. They argue that learning sustainability in the curriculum requires more than a reorganisation of content, as it cannot be simply integrated into a curriculum that implicitly promotes sustainability (see Box 5.23). Effectively, education in schools, colleges and universities is seen as contributing to the predicament confronting our society¹³⁷. It is not a part of the problem as well as part of the solution¹³⁸.

One way knowledge is disseminated within the curriculum of these institutions needs to be challenged. Approaches that help students to construct knowledge through the learning experience have been advocated. Learning for sustainability encourages students to envision and collaboratively construct their concept of sustainability in a way that is meaningful to their own specialist areas. It is a collaborative process that develops skills in 'critical reflection', systemic thinking as well as action-oriented skills for change¹³⁹. Learning for sustainability involves an innovative approach to teaching that will require the professional development of staff and the

■ Box 5.22 Education About and For Sustainability in Australian Business Schools¹³²

This study found that education *about* sustainability is the prevalent approach in Australian Business Schools. Sustainability is treated as an additional piece of content to be incorporated into an existing curriculum.

Monash University, MT Eliza, RMIT and University of South Australia deal with sustainability issues such as corporate environmental and social responsibility in their core subjects. A number of other MBA programs such as those offered by UNSW, AGSM and the University of Sydney offer elective subjects relating to environmental or sustainability themes¹³³.

While addressing these issues in the MBA curriculum is a positive development, it would be enhanced by developing graduate skills to integrate sustainability into their decision-making process. This requires more than the provision of sustainability content and involves a different approach in how students are taught to consider and contribute to sustainability issues.

■ Box 5.23 Innovation not Integration

Education for sustainability is an innovative and interdisciplinary process requiring participative and holistic approaches to the curriculum. It cannot be inserted into existing teaching and learning structures. (It) has a transformative agenda that requires and often leads to professional, curriculum as well as structural change¹⁴⁰.

Tilbury (2003, p.98)

'Sustainability cannot simply be integrated into existing curricula. It requires a transformative agenda that would require changes in education practices, addressing the way knowledge is sliced up into disciplines, as well as making structural changes in institutions'.

Parliamentary Commissioner for the Environment (2004, p.76)

■ Box 5.24 Institutional Change

'Sustainability implies a double learning challenge to higher education, concerning both 'paradigm' and 'provision'. The possibility of reorientation of higher education in the context of sustainability depends on widespread and deep learning within the higher education community and by policy makers – and this has to both precede and match change in learning provision and practice'.

Sterling (2004, p.49)

■ Box 5.25 Learning for Sustainability in VET¹⁴⁰

Renewable energy courses at Brisbane Institute of TAFE are guided by principles which aim to:

- make sustainability the core of engineering studies;
- provide learning about the context of technology including the social, environmental and economic impacts and barriers to renewable energy technology adaptation;
- provide a learning setting that demonstrates best practice in sustainable energy systems, energy efficient building design and waste management;
- teach a holistic, inter/multidisciplinary systems approach;
- promote a supportive learning environment for women and other disadvantaged groups;
- work on real problems in the local/regional/global community; and
- work with industry and the community on course development, implementation and review.

■ Box 5.26 University Industry Summit

The recommendations made at this summit reflect the need to engage with the principles of learning for sustainability in curriculum change:

- 'Universities need to review their curriculum to ensure the effective development and assessment of generic skills in education for sustainability across all faculties.
- Universities need to involve a range of stakeholders in overseeing this curriculum review process.
- Universities need to offer opportunities for professional development of staff in education for sustainability.
- Universities need to ensure that all graduates, regardless of specialism have opportunities to learn about and for sustainability.'

Tilbury & Cooke (2001, p.3)

■ Box 5.27 Learning for Corporate Sustainability at UTS

'*Responsible Business* at UTS seeks to establish links between business management and sustainability issues. It encourages value-based management and attempts to bridge the gap between personal and professional ethics. The subject builds 'critical reflection' skills and is action-oriented.'

Bubna-Litic (2004, p.1)

development of appropriate curriculum resources if it is to be embraced in the curriculum.

To add to the challenge, it is unlikely that these new teaching and learning approaches will be embedded within the curriculum if it is not accompanied by a simultaneous and more profound process of institutional change (see Box 5.24). Recent programs such as *Learning for Sustainability*¹⁴¹ or *Action Research for Curriculum Change Towards Sustainability*¹⁴² have experienced the benefit of approaching these challenges in tandem. The program design acknowledged the need for professional development which can support institutional change and enable curriculum change for sustainability.

One example of innovative curriculum design in VET is the holistic approach to sustainable futures adopted in renewable energy courses at Brisbane Institute of TAFE (see Box 5.25)

Graduate Skills for Sustainability

The need for innovation in the curriculum is also supported by leading thinkers in corporate sustainability. The lack of business graduates with the skills required for change towards sustainability has been noted¹⁴³. This skills requirement was explored at a university and industry summit convened by the National Environmental Education Council in 2001 at Macquarie University¹⁴⁴. General agreement emerged that there was a lack of students with the capacity to address sustainability challenges (see Box 5.26). Specifically, a need was identified for graduates with *generic* skills in:

- Dealing with complexity and uncertainty;
- Critical, systemic and futures thinking,

- Action-oriented skills to motivate and manage change;
- Stakeholder engagement skills and an appreciation for multi-cultural understanding; and
- Practical problem-solving and management skills¹⁴⁵.

These trans-disciplinary skills need to be addressed in the curriculum of all professional sectors¹⁴⁶, not only universities but also in colleges and other training institutes.

The University of Technology Sydney (UTS) is attempting to address this skills requirement by offering a sub-major in sustainability in their MBA program¹⁴⁷. Subjects offered include change management and corporate responsibility. The approach to teaching attempts to build the skills required for change towards sustainability by developing a practical aptitude in change management programs as well as encouraging 'critical reflection' on the role of business in society (see Box 5.27).

Need for Higher Education Staff Development

There are a number of factors that cause problems in curriculum change for sustainability and highlight the need for professional development. Academic staff have traditionally proven resistant to any curriculum changes from outside the bounds of their own curriculum, having been trained in disciplines before the trans-disciplinary agenda of sustainability emerged¹⁵⁰. There is also the tendency to see curriculum changes for sustainability as yet another initiative to accommodate in a workplace that has been flooded with other demands, has few resources to implement them and has received inadequate training and support to do so¹⁵¹.

These issues point to the need for staff development in tertiary education institutions such that lecturers, tutors and researchers can engage with the principles of learning for sustainability in their own disciplines. Many overseas initiatives have recognised that these processes of staff development can also help to engage staff in broader organisational and cultural change across the whole of the institution¹⁵² (see Box 5.28 and 'The Need for Institutional Change' on page 23). They see action research (see glossary) as a means to incorporate the goals of professional development with cross-disciplinary curriculum change and institutional reform.

Similar requirements exist in VET. A need has been identified for universities and other providers of VET teacher training to equip trainee teachers with appropriate skills in program design and delivery, and a critical awareness of their role as adult educators and trainers for sustainability. Retraining and professional development of existing VET teachers (and managers) is also a priority if progress is to be achieved in the short to medium-term¹⁵³.

Action Research for Curriculum Change

On the international stage UNESCO and OECD projects have used action research for the professional development of teachers for the past two decades¹⁵⁴. Action research provides a highly complementary means to engage with the principles of learning for sustainability in curriculum and professional development¹⁵⁵. It is a collaborative research tool that encourages reflection on teaching practice and actively engages educators, students and other stakeholders in action for change towards sustainability (see Box 5.29).

Action research also provides a methodology for institutional change. It encourages the active engagement of multiple stakeholders including students and those involved in management and operations of Universities. It provides a means to break down traditional organisational boundaries. The compatibility between learning for sustainability approaches and action research offers many opportunities for the improvement of vocational training which, by its nature, tends to be practically oriented and action based.

An action research project at Macquarie University has addressed learning for sustainability in the curriculum¹⁵⁶. This project has resulted in change within the curriculum as well as challenging some of the University's administrative and management structures (see Box 5.30).

Need for Champions in Learning for Sustainability

There has been little consideration in the further and higher education sector for the need to develop professionals in learning for sustainability who can take on roles outside formal and higher education. Professionals in learning for sustainability need to be equipped with the skills to champion and lead learning initiatives across all sectors of society including industry, government and the community – not just in formal education. Another issue is that in universities and colleges, the development of sustainability expertise has tended to be the remit of the environmental and life sciences faculties, with scant attention given to the need to develop professionals from other specialisms (see Box 5.30).

Only two Australian Universities seek to develop specialist skills in learning for sustainability approaches to EE for those working outside of

■ Box 5.28 The Environmental Agenda: Taking Responsibility¹⁴⁸

In 1995, a series of symposia took place in the UK to promote sustainable practice through higher education curricula. This initiative was driven by the then UK Council for EE and involved stakeholders from government, NGOs, higher education and industry. The aim of these events was to collaboratively explore issues around engaging with EE across the full portfolio of disciplines. They advocated greater interaction between disciplines and a transdisciplinary approach to engaging with EE across the curriculum¹⁴⁹.

Change for sustainability will require greater interaction and co-operation between all professions due to the systemic nature of the challenges faced. This needs to be reflected in the approach taken to sustainability in the curriculum and higher education institutions as a whole.

■ Box 5.29 Developing Learning for Sustainability Specialists

London South Bank University in the UK offers a postgraduate program focusing on education for sustainability. It is designed for professional educators and those involved in non-formal and informal teaching roles in other sectors. Key learning outcomes in this Masters program include building capacity and leadership. There is also the opportunity to design and build an education for sustainability strategy for the sector in which participants work¹⁵⁹.

■ Box 5.30

Action Research for Change Towards Sustainability

'Lecturers are beginning to sow the seeds of change within the curriculum and are challenging some of the management and administration structures of the institutions.'

Tilbury (2004, p.108)

Action Research for Change Towards Sustainability (ACTS) is a Macquarie University and DEH project that explores ways of changing curriculum and developing graduate sustainability skills. It is a two-year project focusing on¹⁵⁶:

- exploring research based activities to innovate for sustainability through curriculum, professional and/or organisational development;
- professional development of teachers of postgraduate units; and
- cross-faculty involvement.

The project is ongoing and positive outcomes have already been achieved beyond Macquarie University. UNSW's Faculty of the Built Environment have engaged with the principles of learning for sustainability and changed the approach adopted in undergraduate teaching and there are also plans to innovate teaching practice in Business Accounting at Griffith University¹⁵⁷.

■ Box 5.31

Curriculum in Institutional Change

Harvard University has developed an Extension School Course which reaches out to students as far away as Australia and Iraq. The objective of '*Sustainability: The Challenge of our Institutions*' is to share the lessons learned from the Harvard campus greening experience and it includes exercises designed to relate sustainability issues to individual students' experiences¹⁶³.

formal education. The Master of Environmental Education offered at Griffith University is designed to give educators the opportunity to learn skills in reorienting education towards learning for sustainability. It addresses conceptual models and highlights the transformative nature of this approach. The Masters of Sustainable Development at Macquarie University has engaged with the principles of learning for sustainability in the approach taken to teaching its core units¹⁶⁰. Students develop the skills to build their own framework for Environmental Education for Sustainability programs and evaluate international programs¹⁶¹. These units are also available to students through the Master of Environmental Education, Wildlife Management and Environmental Management¹⁶². There is a need for further programs of study to develop professionals capable of educating all sectors of society for sustainability.

Making Systemic Links

Learning for sustainability in the further and higher education sector has been treated as a component to be added onto existing curriculum subjects and course modules¹⁶⁴. These approaches often neglect the need for innovation and broader

institutional change that lies at the heart of learning for sustainability. Internationally, some progressive Universities are making the connection between campus greening, curriculum development and the broader process of institutional change, and are attempting to share their experience (see Box 5.31).

However, most education institutions are failing to embrace the challenge of curriculum change and engagement with the principles of learning for sustainability is rare. Without a fundamental and deeper process of learning for change, sustainability in the further and higher education sector will continue its current trend towards a piecemeal approach that addresses components of practice without engaging the whole of the institution.

Professional development in learning for sustainability approaches won't support that process of reform¹⁶⁵. Learning for sustainability would engage and equip academic staff in a broader process of cultural and organisational change in higher education institutions¹⁶⁷. Educating academic staff for sustainability also has implications for both the content and pedagogy of teaching that is required to prepare graduates for sustainability¹⁶⁸.

ii) Declarations of Commitment to Sustainability

number of higher education organisations and professional associations have responded to documents such as 'Agenda 21' and other international calls to address sustainability in higher education (see Box 5.32 and Box 5.33). They advocate sustainability, mostly within higher education, and provide encouragement and support to institutions in this regard by facilitating cross-institutional collaboration and knowledge-sharing. These organisations and professional associations have also been responsible for the development of sustainability declarations committing those universities to specific actions to address sustainability through campus operations, research and teaching activities.

Understanding the evolution and substance of these declarations helps build a picture of the status of sustainability in higher education. These declarations have become influential frameworks for incorporating sustainability principles and practices mostly within higher education institutions¹⁶⁹.

International Declarations for Sustainability in Higher Education

The UN International Environmental Education Program (1975 – 1995) was the first to introduce the notion of sustainability in higher education¹⁷⁰. The 1990s subsequently witnessed the development of a number of international declarations by organisations advocating for the adoption of sustainability in universities (see Table 5.2).

Table 5.2
Outline of the Most Significant Declarations

Year	Declarations & Charters	Organisation	Signatories
1990	Talloires Declaration ¹⁷¹	ULSF	310
1991	Halifax Declaration ¹⁷²	Consortium of Canadian institutions, the IAU and the United Nations University	20
1993	The Kyoto Declaration ¹⁷³	IAU	N/A
1993	Swansea Declaration ¹⁷⁴	Association of Australian Government Universities	N/A
1994	COPERNICUS University Charter for Sustainable Development ¹⁷⁵	Association of European Universities	291
2001	Lunenburg Declaration ¹⁷⁶	GHESP	N/A
2002	Ubuntu Declaration ¹⁷⁷	11 international higher education organisations	N/A

Box 5.32 Sustainability Declarations

'If we are to fully understand the state of sustainability in higher education and how we might proceed in the future, we must first understand the evolution of sustainability declarations and how such declarations have helped frame their commitment to sustainability in the past.'

Wright (2004, p.7)

Box 5.33 International Organisations Pursuing Sustainability in Higher Education

- ULSF - University Leaders for a Sustainable Future
- COPERNICUS - Cooperation Programme in Europe for Research on Nature and Industry through Coordinated University Studies
- GHESP - Global Higher Education for Sustainability Partnership
- IAU - International Association of Universities
- AEU - Association of European Universities
- AAGU - Association of Australian Government Universities

Agenda 21

'Countries could support university and other tertiary activities and networks for environmental and development education. Cross-disciplinary courses could be made available to all students. Existing regional networks and activities and national university actions which promote research and common teaching approaches on sustainable development should be built upon, and new partnerships and bridges created with the business and other independent sectors, as well as with all countries for technology, know-how, and knowledge exchange.'

United Nations (1992, p.1)

Box 5.34

The Talloires Declaration: Ten Point Action Plan:

1. Increase awareness of environmentally sustainable development;
2. Create an institutional culture of sustainability;
3. Educate for environmentally responsible citizenship;
4. Foster environmental literacy for all;
5. Practice institutional ecology;
6. Involve all stakeholders
7. Collaborate for interdisciplinary approaches;
8. Enhance capacity of primary and secondary schools;
9. Broaden service and outreach nationally and internationally;
10. Maintain the movement.

ULSF (1990, p.1)

Australian Signatories to Talloires

- University of New South Wales
- Royal Melbourne Institute of Technology
- Australian National University
- Melbourne University
- University of Technology Sydney
- University of Canberra
- University of Sunshine Coast
- University of Western Sydney

Talloires Declaration

The 'Talloires Declaration'¹⁷⁸ was the first statement of support made by universities to sustainability in higher education. It is a ten-point action plan for addressing sustainability through teaching and research activities, campus operations and cross-sectoral outreach activities at colleges and universities (see Box 5.34).

This Declaration is the most widely prescribed international declaration with 310 signatories from over 40 countries worldwide¹⁷⁹. In Australia, 8 universities are signatories to this declaration and have committed their institutions to address sustainability under its auspices (see Box 5.34).

Other Significant Declarations

While the 'Halifax Declaration'¹⁸⁰ is well known, it is specific to Canadian universities, whereas the 'Kyoto Declaration'¹⁸¹ is more international in nature. Common to both is the recommendation for universities to develop frameworks and concrete action plans to implement Talloires.

The 'Kyoto Declaration' arose from the Ninth International Association of Universities Round Table discussion¹⁸³ in 1993 and was closely tied to 'Agenda 21'¹⁸⁴. It challenged all universities to promote environmental sustainability through both education efforts and physical operations¹⁸⁵. There are no formal signatories to this declaration, although it was formally adopted by the 90 international university leaders assembled at the Kyoto gathering¹⁸⁶.

The 'Lüneburg Declaration'¹⁸⁷ was drafted by members of GHESP prior to the Rio +10 Higher Education for Sustainability Conference held in Lüneburg, Germany in 2001. This declaration synthesises the recommendations of preceding sustainability declarations, but

also recognises the problems with implementing previous declarations and calls for the development of a toolkit to enable universities to translate their written commitments into practice¹⁸⁸.

In the lead up to the World Summit on Sustainable Development, UNESCO, IAU, COPERNICUS, GHESP, ULSF and a number of other organisations developed and endorsed the 'United Nations Declaration'¹⁸⁹ (see abbreviation and refer to Box 5.35). It reinforces previous recommendations made in other declarations and is noteworthy as the first to bring together science, technology and learning for sustainability with a view to encouraging integrated and holistic approaches to sustainability issues.

National Sustainability Charters and Agreements

As well as becoming signatories to international declarations, a number of Australian universities have endorsed national charters and declarations. There are two national charters commonly signed by universities – the 'Greenhouse Challenge'¹⁹¹ and the 'Universities of Australia Ecology Development (UAED) Charter'¹⁹².

Launched in 1999 by the National Union of Students, the 'UAED Charter' is the more significant of these for higher education (see Box 5.36). This charter is similar in content to the 'Talloires Declaration' and provides a strong framework to guide sustainability within Australian Universities. However, progress towards implementation of the initiatives outlined in the Charter has not been assessed or documented. Since the 'UAED Charter' is a specific Australian initiative it does not carry as much weight as other international agreements such as Talloires, which have the support of key international

isations, such as ULSF, IAU and UNESCO (see abbreviations).

Themes in Declarations

There are some commonalities amongst all of these declarations from *Talloires* to *Ubuntu* as later declarations have tended to reinforce intentions and contributions those preceding them. Each refers to the 'moral obligation' of universities to become sustainable institutions and they all point to the need for outreach activities to engage stakeholders from the broader society in the activities of universities. The development of 'environmentally friendly' staff, faculty and students is a recurring theme, along with partnership-building across all sectors.

Although some of these declarations refer to the need to establish an institutional culture of sustainability¹⁹³, few universities have addressed the process of organisational change that would establish such a culture. Leading thinkers have emphasised the need to engage the whole of the institution in a learning process of systemic, institutional change if sustainability is to be properly addressed in higher education¹⁹⁴ (refer to Table 5.3)

Putting Principles into Practice

Much of the value of these declarations is in providing a vision for sustainability, bringing the sustainability agenda to the attention of further and higher education leaders and in the role of supporting associations as knowledge-sharing networks encouraging inter-university and cross-sectoral collaboration. In a few instances they have catalysed the development of sustainability policies, strategies and action plans¹⁹⁵.

■ Box 5.35 University Leaders for a Sustainable Future¹⁹².

University Leaders for a Sustainable Future (ULSF) is one of the pre-eminent international organisations addressing sustainability in higher education. The ULSF mission is to make sustainability a major focus of curriculum, research, operations and outreach at higher education institutions worldwide. It has developed a list of the common themes a sustainable university should address:

- Integration of sustainability across the curriculum;
- Focus on sustainability issues in research activities;
- Outreach to other sectors of society including schools, industry, government and NGOs;
- Sustainable campus management and institutional operations;
- Professional development for sustainability; and
- Opportunities for students to become involved with sustainability initiatives.

■ Box 5.36 The Universities of Australia Ecological Development Charter

1. **'Formulate and implement university wide environment policies** including detailed strategic plans regarding energy, waste, water, purchasing, natural and built environment, transport and curriculum.
2. **Adequately resource the implementation of these policies**, including the employment of specific personnel to assist with the establishment, monitoring and evaluation of environmental programs within the university.
3. **Actively promote the urgent need to address environmental issues**, including university participation in co-operative projects with non-government and student organisations.
4. **Develop, maintain and encourage information sharing** between all Australian universities in relation to issues of ecologically sustainable development.
5. **Develop, maintain and encourage links** with primary and secondary schools around issues of environmental sustainability.
6. Seek to ensure that **principles of ecologically sustainable development** are incorporated into all areas of education, training and research within the university with a view to improving the environmental literacy of all students and staff.
7. Sponsor ongoing discussions with appropriate representatives of local **indigenous groups** with a view to reaching consensual agreement on land use issues.
8. Establish an **independent body, which monitors and evaluates** the implementation of the principles and under-takings in this charter and facilitates communication and co-operation between universities on sustainability issues.'

ACTS (2004, p.1)

Acc no-16004



■ Box 5.37
Beyond Endorsement

'Endorsing a declaration is no longer adequate proof of a commitment towards becoming more sustainable'.

Wright (2002, p.210)

■ Box 5.38
Feasibility of Sustainability

Programs to encourage engagement in sustainability both through curriculum and operations need to take into account the economic nature of institutions and the programs must be realistic in their objectives. For example:

- Many eco-buy options are still prohibitively more costly than products made from virgin products.
- Sustainability is not viewed as the core business of universities by the majority of users of these facilities. In this way, they reflect the wider society, especially the commercial and business sector.

■ Box 5.39
GHESP Resource Project

'The purpose of the online Global Higher Education for Sustainability Partnership Project is to provide regionally relevant resources, tools, and change strategies to individuals and institutions around the world who are striving to make education for sustainability a major focus of teaching, research, service, and physical operations... The project is developing through an ongoing global dialogue and consultation process that engages diverse cultures and individuals in identifying resource needs and contributes to a dynamic and ever evolving online resource center.'

ULSF (2004, p.1)

■ Table 5.3
Alignment of Declarations with an Institutional Culture of Sustainability
Adapted from Wright (2004, p. 13)

Declaration	Moral obligation	Public outreach	Campus greening	Environmental literacy	Interdisciplinary curriculum	Research activities	Cross-sectoral partnerships	cooperation
Talloires	X	X	X	X	X	X	X	
Halifax	X	X		X			X	
Kyoto	X	X	X	X		X	X	
Swansea	X	X	X	X		X		
COPERNICUS	X	X		X		X	X	
Lunenburg	X	X			X	X	X	
Ubuntu	X	X			X	X	X	

To date, there has been no formal evaluation of the extent to which the recommendations of these declarations have been implemented by their signatories¹⁹⁶. Some have argued that these statements of support constitute 'greenwashing' on the part of higher education, resulting in few meaningful steps towards institutional change for sustainability¹⁹⁷ (see Box 5.37).

In Australia, the ANU, a recent signatory, has established a detailed point-by-point implementation plan to address its commitment to Talloires¹⁹⁸. UTS has established a sustainability policy and is committed to a broad range of sustainability initiatives in its campus operations, research activities and through the curriculum¹⁹⁹. However, one review has found that just over half of Australian universities endorsing these declarations have made at least some attempt to implement their key recommendations²⁰⁰.

The feasibility of putting policy practice can come against many, not the least of which are the economic factors (see box 5.38). Calls have been made for the development of research such that the sector can translate the adoption of these declarations into action²⁰¹. In a bid to address this need, the GHESP is in the process of developing both online and print resources to assist universities in reorienting towards sustainability (see Box 5.39).

In practice many universities struggle to fulfil their commitment through institutional policies and implementation plans²⁰². This would suggest that declarations are at least of some value in providing direction and instigating a process of change. However, they need to be accompanied by a process of institutional strengthening and professional capacity building in order for their principles to be properly put into practice.

Institutional Learning for Change

institutional²⁰³ learning and change in all sectors is critical for the achievement of sustainability, but especially in the further and higher education sector. This is because institutions operating in an educational capacity have a formative influence on their students and on students' potential to inform change for sustainability in the sectors in which they become employed²⁰⁴ (see Box 5.40).

Universities equate change for sustainability with adding sustainability to the curriculum, or campus greening initiatives designed to minimize the environmental impact of operations²⁰⁵. These programs are a piecemeal approach to tackling sustainability issues resulting in minimal improvements in staff and student practice²⁰⁶. They build awareness and can achieve greater resource efficiency, however, they fail to address the underlying causes of unsustainable practice in further and higher education institutions or prepare students to contribute to a more sustainable society. Some have argued that in order for deep and lasting change to be achieved, sustainability issues need to be addressed in a more systemic way that involves the whole of the institution in learning based strategies for change²⁰⁷.

The Need for Institutional Change
Sustainability presents a significant challenge and opportunity to review existing structures and organisations across society (see Box 5.41). Our further and higher education institutions need to

learn how to think about, and respond to, sustainability issues as their current campus greening and curriculum change approaches are proving inadequate to properly address them²⁰⁸.

Stephen Sterling promotes a strategic approach to institutional change, based upon identifying and addressing the root causes of sustainability issues²⁰⁹. Instead of just focusing on resource efficiency, universities should also address the underlying and interconnected reasons for unsustainable consumption amongst its staff and students (see Box 5.42). Stephen Dovers maintains that systemic change, including significant reform of our institutional arrangements, is required for any meaningful progress towards sustainability to be made²¹⁰.

This is supported by the work of other leading thinkers in this field who concur that if 'education *for* change' is to occur in higher education then 'change *in* education' will be required²¹¹. This is not a new development in learning for sustainability approaches to Environmental Education, as chapter 36 of 'Agenda 21'²¹² called for the reorientation of education systems for sustainability in 1992. While efforts have been made to reorient curriculum and campus practice, little in the way of systemic change that engages the whole of the institution has been attempted²¹³.

Whole-of-institution change for sustainability in higher education

■ Box 5.40 Role of the Universities

'No institutions in modern society are better situated and more obliged to facilitate the transition to a sustainable future than colleges and universities'.

Orr (2002, p.96)

■ Box 5.41 Need for Institutional Change

'Without institutional change we will not move purposefully towards sustainability.'

Dovers (2001, p.1)

■ Box 5.42 A Deeper Change

'Sustainability does not simply require an 'add-on' to existing structures and curricula, but implies a change of fundamental epistemology in our culture and hence also in our educational thinking and practice. Seen in this light, sustainability is not just another issue to be added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organisational change, of policy and particularly of ethos.'

Sterling (2004, p.50)

■ Box 5.43 Principles for Institutional Change²¹⁵

Participation: The full range of stakeholders are actively involved in all aspects of change.

Purposefulness: Change initiatives are informed by collaboratively constructed principles, visions and goals.

Persistence: There is a shift from ad hoc change programs to long-term strategic initiatives reflecting an agreed direction.

Flexibility: There is a move from rigidity to responsiveness in organisational approaches - plans for change are adaptive.

Contextual: Initiatives are well informed and contextually relevant to the particular situation of the organisation and its culture.

Organisational Learning: Shift from responding to problems to learning to address their root causes.

■ Box 5.44 Higher Education Engaging with the Community

Sheffield Hallam University in the UK is beginning to engage with its stakeholders in broader society. Its policies advocate the development of community partnerships, joint ventures and networking initiatives. For the University the significance of this is in the process of dialogue and relationship building with stakeholders external to the institution, and less so the actual content of the engagement²²⁸. Advocating multistakeholder partnerships is closely aligned with the principles of learning for sustainability²²⁹.

■ Box 5.45 Knowledge Producers

'The institutions that claim the position of the premier and most advanced knowledge producers in society frustrate learning and social change in most of their internal processes and their articulation with the surrounding society.'

Levin & Greenwood (2001, p.103)

has been described as a process that encompasses professional, curriculum and organisational development²¹⁴. It involves multi-modal change engaging every dimension of the university. The benefit of this approach is that it links together change programs in such a way that the achievement of each program's objectives is supported and complemented by the work of other programs.

Principles for Institutional Change
Principles for effective institutional change for sustainability have been identified (see Box 5.43). These do not represent a comprehensive check list for how change should be managed, but rather a set of over-arching tenets that should guide change initiatives.

These principles are closely aligned with those of learning for sustainability. The works of Sterling²¹⁶, Corcoran and Wals²¹⁷, Fien²¹⁸ and Tilbury²¹⁹ have all emphasized the importance of engaging multiple stakeholder groups in participatory planning and collaborative learning for ongoing change towards sustainability. This is supported by the literature in organisational theory, which has also identified the need for a learning process to institutionalise change²²⁰.

The next critical challenge for sustainability in higher education institutions is the adoption of the principles of participation and of organisational learning in change initiatives (see Box 5.45). There is a significant body of literature exploring these two tenets of sustainability, which can guide sustainability policy and programs in higher education.

Participation in Institutional Change towards Sustainability

The transition to sustainability is best described as an ongoing process of change that engages all stakeholders

in collaborative learning²²¹, because sustainability is not a fixed concept that can be imposed²²². Its meaning is constructed through stakeholder dialogue, and it is achieved by building capacity for change. For organisations this involves the active participation of multiple stakeholder groups in the development of a shared vision for sustainability. It will also involve a collaborative process of 'critical reflection' on current unsustainable practices, identifying the underlying reasons for it, and stakeholder engagement is required at every stage of the ongoing change process that advances institutions towards sustainability from planning, to implementation and evaluation²²⁴.

Addressing Participation in Sustainability Programs

A common approach to stakeholder engagement is to actively involve them in the operation of sustainability programs. The engagement and participation of stakeholders is good practice in change towards sustainability²²⁵. Many universities and college environmental programs address this by encouraging the involvement of students and staff in ecological foot-printing and other campus greening initiatives²²⁶. However, stakeholder participation is more than active involvement in the operation of programs. It embraces the concept of collaborative learning for informed, shared decision-making at every stage, especially when institutional change is a goal²²⁷.

Engagement with external, as well as internal, stakeholders is required for universities and colleges to properly address society's needs in the transition to sustainability. However active collaboration between universities, Registered Training Organisations and colleges with their external stakeholders is not common²³⁰. Some of the more

diverse education institutions promoting dialogue and building relationships with their community leaders (see Box 5.44). In VET, institutes have established a broad range of training partnerships with business and community organisations. However, few of these focus explicitly on sustainability and those that do tend to be localised in scope.

There is some evidence to indicate that further and higher education institutions in Australia are beginning to move out to a broader range of stakeholders in a more meaningful way. The National Environmental Education Council (NEEC) has been instrumental in a series of University Sustainability Summits designed to encourage sectoral collaboration for change towards sustainability²³¹. The first summit held in 2001 provided a valuable opportunity to exchange views on how tertiary institutions can contribute to industry, and assist in the development of sustainability curricula²³². Summits were convened at the University of Canberra, Macquarie University in Sydney and Murdoch University in Perth, bringing together stakeholders from business, industry, government organisations and tertiary institutions²³³. Dialogue led to concrete recommendations for campus and curriculum change to better address the need to educate graduates for sustainability, such that their skills for achieving change were developed²³⁴. The Macquarie Summit in 2001 catalysed an action research initiative designed to achieve curriculum change in such a way that would also lead to a more profound process of organisational change²³⁵.

Addressing Participatory Planning for Change

The level of sustainability-related activity in the further and higher education sector is evidence that

interest and support for sustainability issues is high across education institutions²³⁶. However, the ad hoc nature of the measures taken to achieve sustainability lacks a strategic approach that would embed change more deeply in institutional practice²³⁷. It has been argued that further and higher education needs to adopt a more integrated and long-term view on organisational change in order to move beyond its rhetorical adoption of the principles of sustainable practice²³⁸.

The collaborative development of a shared vision for sustainability is a critical element of achieving institutional change²³⁹. It establishes the purpose of change programs, informs their direction and motivates action²⁴⁰. Meaningful change in the higher education sector has been described by Ali Khan as a process that involves multiple stakeholder groups in collaboratively developing visions for change towards sustainability in a way that repositions Universities within their community of stakeholders, both internal and external²⁴¹. This has the benefit of building a broad base of ownership and support for the change plans. However, most education institution planning processes are still based on a traditional hierarchical management technique where change is driven from the top down²⁴². This type of management makes building a broad base of commitment to sustainability difficult as responsibility for decision-making regarding change is not shared²⁴³.

Organisational Learning for Change towards Sustainability

Internationally recognised literature on organisational theory clearly points to the need for organisational learning in order for change to be effective²⁴⁴. With globalisation and the rising importance of the knowledge economy, there is growing acceptance that the value of

■ Box 5.46

Organisational Learning

Different approaches to achieving institutional change have been suggested from top-down strategic planning, to the establishment of change management units responsible for process reengineering, to whole systems design²⁵⁴. Organisation development theory has been greatly influenced by the work of Peter Senge²⁵⁵, Aric de Geus²⁵⁶, Chris Argyris and Donald Schon²⁵⁷, all of whom have emphasized the importance of organisational learning for change to be effective. This has been embraced by progressive corporations with respected visionaries such as General Motors CEO Jack Welch equating competitive advantage with a company's ability to learn²⁵⁸.

Organisational learning is more than the sum of the parts of individual learning. Learning organisations embed learning into the fabric of their operations. They have developed the ability to gain insight and understanding from both positive and negative experience through experimentation, observation and analysis. These cycles of experiential learning are closely related to the methodology of action learning.

■ Box 5.47

Transformative Learning

'The learning required in becoming a learning organisation is transformational learning'.

Kofman & Senge (1995, p.37)

A learning organisation is supported by a learning culture that encourages the critical examination of values, the co-creation of visions and systemic and participatory approaches to problem-solving. It embraces collaboration, team learning and open dialogue, all critical components of transformative learning and highly congruent with the principles of learning for sustainability.

■ Box 5.48 Universities Establishing 'Centres of Change'

The University of British Columbia in Canada was one of the first to establish and implement a sustainable development policy²⁷⁸. This led to the formation of Sustainable Development Research Institute and a Campus Sustainability Office, which instigated a number of campus greening and curriculum change initiatives. They attempted to encourage participation by establishing 'sustainability circles' for dialogue on sustainability issues and encouraged staff to become 'sustainability co-ordinators'²⁷⁹.

However there has been resistance to their attempts to instigate change, in the curriculum especially. It is unclear why this is the case. However, the initiative could do more to share decision-making across stakeholder groups.

■ Box 5.49 Action Research and Organisational Change for Sustainability

Action Research promotes stakeholder empowerment and engagement in collaborative cycles of planning, implementation and evaluation²⁶⁶. Its fundamental premise is that participation in problem assessment, design and change greatly increases the chances of embedding change within the institution²⁶⁷.

This is especially significant in higher education. The 'latent curriculum' of lessons taught through institutional practices and operations is as important as the actual curriculum, especially when the two reinforce each other²⁶⁸. It is not adequate to merely foster environmental literacy, stakeholders must also be engaged in the change process such that their sense of ownership, responsibility and capacity is developed for addressing sustainability issues. Action research has been advocated for all stakeholders to become active change agents and champions of sustainability²⁶⁹. By adopting this methodology, change projects can engage and educate a broad diversity of stakeholders²⁷⁰.

organisations is based in the capacity of its human capital to respond to change (see Box 5.46)²⁴⁵. The business and industry sector is making the shift from top-down planning and management approaches that perpetuate rigid hierarchical organisations to a more flexible mode of operation²⁴⁶. Further and higher education has been slow to catch up with this evolution of organisational thinking²⁴⁷. While progressive corporations have engaged with the concept of organisational learning for change in order to remain competitive, education institutions have been described as 'ivory towers' resistant to change for reasons relating to their hierarchical structure, traditional management and bureaucratic procedures²⁴⁸. Few further and higher education institutions are engaging with the concepts of organisational change in their sustainability initiatives²⁴⁹. Fewer still are making the connection between effective organisational change and learning based change²⁵⁰.

Peter Senge has called for the development of 'learning organisations'²⁵¹, however universities have largely remained 'knowing organisations' where teaching, research, operations and relations with local communities are treated as distinct activities conducted in isolation from each other²⁵². Change for sustainability requires the integration of these activities such that the context, content and process of learning reflect the principles of sustainability²⁵³.

This involves a process of organisational learning for change whereby universities and colleges assess every aspect of their role and adopt a whole-of-institution approach to achieving sustainability²⁵⁹. It has been suggested that this type of learning organisation has embraced transformative learning. Transformative learning is learning that

produces change²⁶⁰. It encompasses the notions of experiential learning, reflection as well as 'critical reflection' on action²⁶¹ and is closely aligned to a learning for sustainability approach (see Box 5.47).

Approaching Organisational Change

Leith Sharp is a leading advocate of learning for organisational change towards sustainability in higher education and runs a successful campus greening program at Harvard University²⁶². She promotes the importance of crossing divisional boundaries and engaging multiple stakeholders in learning for organisational change²⁶³. In practice internationally, the ideal of whole-institution learning for change is rare. The establishment of specialised centres in sustainability is a more common approach.

The University of British Columbia in Canada attempted to institutionalise a commitment to sustainability through the activities of an office specialising in change for sustainability (see Box 5.48). The University of Amsterdam is also one of many others attempting to integrate sustainability into education and research activities through the establishment of a similar centre²⁶⁴. However, organisational change initiatives for sustainability are usually more effective when they engage all stakeholders in planning, implementing and evaluating the change process²⁶⁵.

This was demonstrated by the experience of another faculty within the University of British Columbia²⁷¹. The Faculty of Agricultural Sciences has been successful in transforming their own teaching practices by adopting a learning in action approach that is closely aligned with learning for sustainability²⁷². It used a 'scenario workbook' and established

'linking-working' circles dialogue on the direction of change and how it might emerge for sustainability²⁷³. A plan emerged that sought to build a 'community of learners' and a 'flexible and responsive' structure²⁷⁴. It adopted a focus on teaching that developed 'critical' thinking and 'informed decision-making' on sustainability issues²⁷⁵. This included 'linking' faculty change for sustainability²⁷⁶. Action research methodology for institutional change that is highly consistent with the principles of sustainability²⁷⁷ (see Boxes 5.49, 5.50).

However, there has been a failure to implement a whole-of-institution approach to institutional change for sustainability in higher education²⁸⁰. Traditional approaches to curriculum

change and campus greening are the prevalent response to pressure for change²⁸¹. While these incremental change programs indicate a commitment to sustainability, which should be applauded, they do not contribute to the achievement of transformative change that would embed sustainable practice much more deeply across every dimension of these institutions²⁸².

The question remains open as to why further and higher education institutions have not engaged with learning for institutional change for sustainability. Bureaucratic barriers to change have often been identified such as inadequate resources, limited time and a rigid departmentalised organisational structure with hierarchical management²⁸³. It has also been argued that these institutions do not understand the depth of change required to address sustainability and that their capacity must be built in order to do so²⁸⁴.

■ Box 5.50 Organisational Change and Learning Institutions

'The challenge for the University sector is to become skilful at the process of change itself. This requires the University sector to expand its core mission of teaching and research to include learning. Universities must become learning organisations, as well as teaching and research institutions.'

Sharp (2002, p.129)

'The breadth and longevity of organisational change that is needed for this to occur can only be achieved if the true nature of the university organisation is revealed and transformed. Mental models must be revealed, questioned and expanded... The fundamental cultures of separation that exist between faculty, administration staff and students must be transcended and perceived mission conflicts between teaching, research and campus operations must be overcome'.

Sharp (2002, p.143)



v) The Changing Nature of Work

■ Box 5.51

The Impacts of Technological Change and Globalisation on Work

The globalised economy pressures industry and business to become more economically competitive and drives the increased adoption of technology and business innovation. These changes are reflected in the range of goods and services produced within the Australian economy and have resulted in significant changes in Australian employment.

The changing composition of employment in Australia is characterised by:

- The rise of the knowledge economy²⁹²;
 - Goods producing industries declining from 44% of total employment in 1970 to 27% in 2000²⁹³; and
 - Service based industries rising sharply from 26% in 1970 to 45% by 2000²⁹⁴.
- Accompanying these changes there has been growth in non-standard employment:
- New jobs are increasingly part-time and casualised²⁹⁵;
 - Just over one in four Australian workers were classified by the ABS as part-time workers in 2000²⁹⁶; and
 - Increased worker mobility with the youth of developed nations today predicted to change careers up to five times and work for 12 to 15 different organisations in their lifetimes²⁹⁷.

The results of these changes can be seen in heightened job insecurity²⁹⁸; limited control of part-time and casual workers over their work situation and their relative exclusion from workplace decision-making processes²⁹⁹; rise in underemployment³⁰⁰; and increase in workplace stress³⁰¹.

The Australian further and higher education literature has noted the rapidly changing nature of work due to the forces of globalisation²⁸⁵ and the rise of Information Communication Technology (ICT)²⁸⁶. These dynamics have implications for the needs of business and industry and the skills required by its workers. Current further and higher education practice and future developments cannot be understood in isolation from these changes²⁸⁷.

The Business Council of Australia (BCA)²⁸⁸, Australian Chamber of Commerce and Industry (ACCI)²⁸⁹ and Australian Council of Trade Unions (ACTU)²⁹⁰ are peak industry bodies leading much of the debate surrounding the changing nature of work. The debate also engages the Australian National Training Authority (ANTA)²⁹¹, in association with government, business and industry and training providers. In order for learning for sustainability to be relevant and integrated throughout further and higher education, it is important to understand and engage in the issues facing the sector from technological change and globalisation.

The Future of Work

Globalisation and technological change influence the skills required by workers to secure and maintain employment (see Box 5.51). Further education, in particular, devotes much effort to predicting and providing for such changes in industry skill requirements³⁰². This is not surprising given that Vocational Education and

Training (VET) is essentially education and training for work.

The world of work has also been affected by increasing casualisation, stressful conditions and reduced job security (see Box 5.51). These changing working conditions, along with the broad acknowledgement that workplace issues greatly affect quality of life³⁰³. Despite this, there are few explicit references to the relationship between sustainable future employment and further education in Australian policy. This is in marked contrast with developments on the international stage where Technical and Vocational Education and Training (TVET) is considered to be an integral component of lifelong learning and change for sustainability³⁰⁴.

Internationally, it has been recognised that further education has a crucial role to play in realising the objectives of a culture of peace, environmental improvement, social cohesion and international citizenship³⁰⁵. This suggests that Australian VET policy needs to extend its focus from the provision of training for industry, to address professional development as an ongoing process of lifelong learning that builds capacity for change towards sustainability³⁰⁶.

In Australia, the debate surrounding the future role of VET has often been restricted to the current skills dominated framework (see Boxes 5.52 and 5.53). This is a positive indication that industry and government recognise the need for developing new knowledge and

the workforce if the changing
of business and industry are
essed. However, it has been
d that this framework does not
igh in specifically highlighting
required to develop capacity
towards sustainability in
lace and across business and
a whole³⁰⁷.

Research and policy
ements within industry and
ent look to the future and
a new direction in further
on³⁰⁸. For example, the recent
of a High Level Review of
Training Packages strongly support
the Training Package model as a
to address the sustainability
s, albeit with some notable
ments. Some have argued
the common exploration of
the nature of work, industry skills
ments, and the role of VET in
the context of change for sustainability
is clearly required³⁰⁹. In line with
the principles of sustainability, this
discussion should involve stakeholder
engagement at all levels in order to build a
shared understanding of needs and to
collectively establish a vision for
the future of VET that would address
these needs.

A noteworthy example of this type
of initiative is the Business Council
of Australia's (BCA) 'Aspire Australia
2025' scenario project³¹³ (see Box
5.54). This initiative was developed
in response to the concern within
BCA that there are few forums for
longterm, holistic, strategic planning
in Australia³¹⁴. The project drew on the
expertise and ideas of a select group
from a diverse range of backgrounds
including government, business,
welfare, environment and youth. It put
forward three possible future scenarios
to encourage debate about Australia's
long-term future³¹⁵.

The Role of Workers and Learners

The dominant VET discourse on the
future and nature of work has tended
to exclude a critical stakeholder group,
the workers themselves. ANTA's
national strategy 'Shaping our Future'³¹⁶
identifies a broad range of stakeholder
groups including government agencies,
peak industry bodies, Industry Skills
Councils, and training providers,
but lacks any reference to student
organisations and worker representative
bodies such as trade unions or
professional associations³¹⁷. Indeed,
a number of critical questions have
recently been posed in this regard³¹⁸
(see Box 5.55).

The impact of the 'new world order'
on work, workplaces and workers calls
for a society-wide dialogue. Change for
sustainability requires all stakeholders,
including workers and learners, to be
involved in the debate surrounding the
changing nature of work. Issues such
as work-family balance, job insecurity,
unemployment and underemployment
are important policy considerations,
as well as important quality of
life considerations. Participatory
envisioning processes and collaborative
dialogue provide the means to
address these issues in a way that is
closely aligned with the principles of
learning for sustainability. Workers
and learners need to be provided with
opportunities through pre-vocational
training and retraining to critically
question and reflect on these changes
and to contribute to the collaborative
construction of a vision for the future
of work, including the development
of knowledge, skills and attitudes to
promote sustainable workplaces and
communities.

■ Box 5.52

Australian Qualifications Framework

'There are unanswered questions about
the future role of the AQF (Australian
Qualifications Framework), competency based
training and training packages as currently
applied. Consideration needs to be given as
to whether these are still the tools to support
effective skill formation in the next decade.'

Business Council of Australia (undated, p.10)

■ Box 5.53

Skills Development

'The Phase 1 research paints a picture of VET
in the future serving a world very different
from the one which initially produced
Training Packages. It suggests that the
challenge of aligning skill outcomes to the
changing world of work, new industry and
labour market dynamics, and different social
circumstances is now even greater than when
Australia first embarked on the path of the
national training reform.

New skills will be needed, underpinned by
new knowledge and learning, and promoted
by new pedagogies. Employees will be subject
to changing employment patterns and
organisational changes. And this will need to
be supported by new ways in which training
providers engage with their clients.

Any model for skills development needs to
sit comfortably in such a future, and make an
effective contribution to achieving it.'

ANTA (2004d, p.3)

■ Box 5.54

Aspire Australia 2025³¹⁰

The Business Council of Australia (BCA) embarked on a 12 month scenario planning project in 2003. The project aimed to contribute to the public policy debate on what future Australian business and society may look like in 2025.

Three scenarios were developed:

- Riding the wave
- Stormy Seas
- Changing the Crew

Six key themes emerged to which the scenarios were applied:

- Sustainable Development
- Governance (Political System)
- Global Competitiveness
- Growth and Social Change
- Australia's Place in the Global and Regional Order
- Values and Norms

The BCA, as one of Australia's leading industry associations, is an influential player in VET policy development and design. Both ANTA and the government draw on the findings of initiatives such as this to inform VET policy³¹¹. This scenario project could have been improved by addressing the role of education and training in creating a sustainable future³¹². Nonetheless, this initiative is an important example of an holistic futures-thinking approach to policy development. Projects such as these provide valuable insight into the challenges and opportunities of sustainability and offer an opportunity to engage business and industry in the dialogue relating to vocational learning for sustainability.

■ Box 5.55

Does VET Cater to all Stakeholders, or are Some Unfairly Privileged?

'Should education for work prepare workers/learners to contribute to debates about the directions that work should take in the future?...

Governments around the world have built their education systems on particular assumptions, such as the correctness of free market economics. But is this the only way forward? Who speaks for the workers/learners? What education do workers/learners need in order to be part of these debates? Is this within the domain of vocational education and training?'

Anderson et al (2004, p.249)

vi Generic Skills

The development of generic or 'transferable' skills in the workforce is relevant to all education sectors (see Box 5.56). These skills are relevant to a wide range of occupations and encompass the broader notion of 'essential life skills'³¹⁹. The National Centre for Vocational Education Research (NCVER) describes generic skills as those skills essential not only for employment but also personal development, fulfilment, community life and responsible citizenship³²⁰.

The inclusion of generic professional skills is a primary concern of VET policy and a researched area within the VET sector. Not surprisingly, the question of what generic skills are required in an 'employable' workforce is one of the most significant debates in VET reform and an important consideration in how learning for sustainability approaches can be addressed³²².

Generic Skills and VET

Generic skills have been widely defined and debated internationally (see Box 5.57 and 5.58). Underpinning the debate in Australia is the legacy of the key competency framework established by the Mayer Committee in 1992, also known as the *Mayer Key Competencies*³²³. The importance of generic skills development has been widely accepted within the Australian education sector. Australian industry and employers not only support their inclusion but also are actively working to influence government policy to extend their range³²⁴.

ANTA has been assessing the feasibility of implementing the 'Employability Skills Framework'³²⁵ through the ANTA Employability Skills Cross Sectoral Coordination Group³²⁶. This industry view is a response to the need for a flexible and adaptable workforce that can respond rapidly to change in the world of work. Increasing numbers of employers have realised that technical or knowledge based skills are less critical to the changing work environment than the 'soft skills' of their employees and their values, attitudes and motivations³²⁷.

Generic Skills and Learning for Sustainability

Despite the considerable focus on skills and competencies for work within the educational debate, little emphasis has been placed on the skills required for change towards sustainability. The current interest in generic employability skills provides an opportunity for the recognition and integration of sustainability skills across education sectors, especially VET (see Box 5.59).

Stephen Sterling has noted that the generic skills debate is prompting reform in the education system³²⁸. However, he challenges the value of such reform. He argues that change towards sustainability requires a process of innovation in the education system such that learners are equipped with the skills to create change for sustainability, and not just respond to the changing needs of the global economy (see Box 5.60). The risks involved in any one stakeholder group

■ Box 5.56 Generic Skills

'The issue of generic skills needs to be 'front and centre' in the redevelopment of Training Packages.'

ANTA (2004d, p. 4)

■ Box 5.57 Common Elements of Generic Skills Frameworks

- **'Basic/fundamental skills':** such as literacy, using numbers, using technology
- **People-related skills:** such as communication, interpersonal, team work, customer service skills
- **Conceptual/thinking skills:** such as collecting and organising information, problem-solving, planning and organising, learning-to-learn skills, thinking innovatively and creatively, systems thinking
- **Personal skills and attributes:** such as being responsible, resourceful, flexible, able to manage one's own time, having self-esteem
- **Business skills:** such as innovation skills, enterprise skills
- **Community skills:** such as civic or citizenship knowledge and skills'

Gibb and Curtin (2004, p.8)

■ Box 5.58

Characteristics of Generic Skills

- Generic skills not only apply to work and workplaces but also to adult life more generally.
- They can be assessed at different performance levels and can be applied across all levels of education and training.
- Industry and education policy organisations have been principally engaged in the generic skills debate.

■ Box 5.59

So What Does the Concept of Sustainability Have to Offer Vocational Education?

'For one thing it offers a broad vision of what vocational education might become that includes ethical as well as economic imperatives. It invites vocational educators to situate their work within a larger project of social, political, and economic change aimed at dealing with equity, social justice, and environmental issues. Its approach to curriculum and pedagogy directs us to recognize the complexity of issues related to work; to explore the connections between individual growth, social development, and global problems/issues; and to understand the scope and scale of concerns related to work, unemployment, education, and economic justice necessitate action at local, national, and international levels of decision and policy making.'

Dipbo (1998, p. 329)

■ Box 5.60

Reforming the Education System

'From a sustainability point of view, the problem with the current change culture driven by Western governments is that it is first order change, and for the wrong reasons. Their approach to 'education in change' is to adapt educational policy to what they predict the globalised information economy will require. Their approach to 'education for change' is to educate people to adapt to change (first order learning) rather than develop their capacity to shape it. Critical debate that lies outside or questions this approach is dismissed or ignored.'

Sterling (2001, p. 43)

dominating the education agenda has also been noted (see Box 5.61).

Similar tensions are displayed in the generic skills debate within the Australian VET sector regarding which type of generic skills are to be emphasised. Crina Virgona and Peter Waterhouse³²⁹ have described the dichotomous nature of the discourse on generic skills. They point to a growing divergence between the views of VET policy makers who emphasise the skills needed for industry to remain competitive; and those of VET practitioners with a more holistic perspective on generic skills. The latter group include broad-based attributes and knowledge for life, work and social and civic participation under the umbrella of generic skills³³⁰. This unease between policy makers and practitioners is even more pointed considering that industry remains the dominant force in VET policy³³¹.

Generic Skills Projects Addressing Sustainability

Some international bodies are addressing capacity-building for sustainability through the development of generic skills frameworks (see Box 5.62). These innovative projects provide valuable insight for similar projects that could potentially be conducted in Australia.

The UK Sustainable Development Education Panel (SDEP) has identified skills development in sustainability as a critical issue for the education system, which includes business and industry vocational training. In 2000, the SDEP published a consultation paper in conjunction with the UK Department for Education and Skills, which promoted the concept of life skills for a sustainable future. The panel also commissioned learning guides on sustainability for a range of VET stakeholders including sector-specific

skills councils, professional bodies and trade unions.

The SDEP recently joined the UK Learning and Skills Improvement Agency (LSDA) and the Learning Future in a series of forums for the *Learning to Last - Skills, Sustainability and Strategy*³³⁴. These forums encouraged dialogue across stakeholders and identified potential steps and ways forward³³⁵. The Learning to Last projects in collaboration with other stakeholders³³⁶. The UK SI also supported the development of a foundation certificate in sustainability (see Box 5.63). Some have argued that there is potential to introduce a similar qualification within Australia³³⁷.

Recently, the National Centre for Sustainability at Swinburne University has taken this recommendation on board and is developing generic guideline standards for all VET Training Packages³³⁸. This project leverages the synergies between generic skills development and learning for sustainability and is building cross-industry acceptance for the importance of sustainability competencies (see Box 5.64).

This project could demonstrate that there are significant synergies between generic skills agenda and learning for sustainability within further and higher education curriculum. Generic skills frameworks offer great potential for promoting sustainability within education and training. This is currently being explored through a NCVER funded project - *Finding the Common Ground: Is there a place for Education for Sustainability in VET policy and practice?*³⁴⁰ - and was a point of discussion at University Industry Summits organised by the National Environmental Education Council in 2001 (see Box 5.26 on page 16).

Teaching Generic Skills

The development of a new pedagogy for VET that addresses the changing skills requirements for sustainability is an increasingly common topic in VET literature. Some have claimed that a new pedagogy is the most significant challenge in generic skills development³⁴³. Anderson, Brown and Brook³⁴⁵ have noted that the wide range of teaching and learning strategies adopted in VET reflect the diversity of contemporary adult teaching styles. Dooley³⁴⁶ has argued that further innovation is required in current approaches in order to embrace learning for sustainability³⁴⁶.

New innovative ways of teaching and learning are required, which integrate the more traditional technical skills with the recently favoured 'soft skills'. Collaborative teaching and learning, work-based learning and action learning are some of the innovative strategies proposed³⁴⁷. These approaches are closely aligned with learning for sustainability and provide significant opportunity to accommodate industry generic skills requirements, while building workforce capacity to address sustainability, as well as institutional innovation across the VET system.

In Australia there is growing interest in how such pedagogy may be applied in practice to the VET system. Challenger TAFE in Western Australia is also attempting to extend knowledge and practice in this area. Their *'Reframing the Future'*³⁴⁸ project aims to develop tools to help integrate sustainability principles within TAFE education. This highly innovative program is adopting an action learning approach to improve teaching practice in line with learning for sustainability (see Box 5.66).

Box 5.61

Influencing the Education Agenda

'The main thrust of reform is about skills and competencies - but informed by what values?'

Sterling (2001, p. 45)

'Often business people aim to influence the structure and content of the formal education system as well. Employers regularly call for better connections to be made between the skills they seek in employees and the skills developed in people through their education. This can be useful in ensuring that education and training programmes meet evolving business needs. However, it is also important to ensure that business leaders' views on knowledge needs do not dominate education.'

Parliamentary Commissioner for the Environment (2004, p. 85)

Box 5.62

The Definition and Selection of Competencies

The Organisation for Economic Cooperation and Development (OECD) was responsible for an international Definition and Selection of Competencies (DeSeCo) project³³². This is a noteworthy example of a generic employability skills project. It sought to build a broad framework for generic skills development. This project aimed to develop competencies in learners that applied to school and work settings as well as life situations beyond those areas³³³. Its innovative approach looked beyond the needs of the labour market and economic drivers to address the contribution generic skills development can make to the following areas:

- 'increasing individual understanding of public policy issues and participation in democratic processes and institutions;
- social cohesion and justice; and
- strengthening human rights and autonomy as counterweights to increasing global inequality of opportunities and individual marginalization.'

Curtis and Mackenzie (2001, p.35)

Box 5.63

Foundation Certificate in Sustainable Development³³⁹

The Sustainable Development Education Panel supported the development of this entry level qualification in sustainable development by the UK vocational awarding body. The course is accredited through the Qualifications and Curriculum Authority and sits within the National Qualifications Framework.

The 30 hour course consists of two units each with two elements:

Unit 01: Understand the role of the individual in sustainable development

Element 1.1 - Understand the impact of a person's actions on sustainability

Element 1.2 - Understand the social and economic implications of actions that affect the environment

Unit 02: How to become an effective participant in sustainable development

Element 2.1 - Understand how individual practices can contribute to sustainable development

Element 2.2 - Understand how an organisation can become more sustainable

Box 5.64

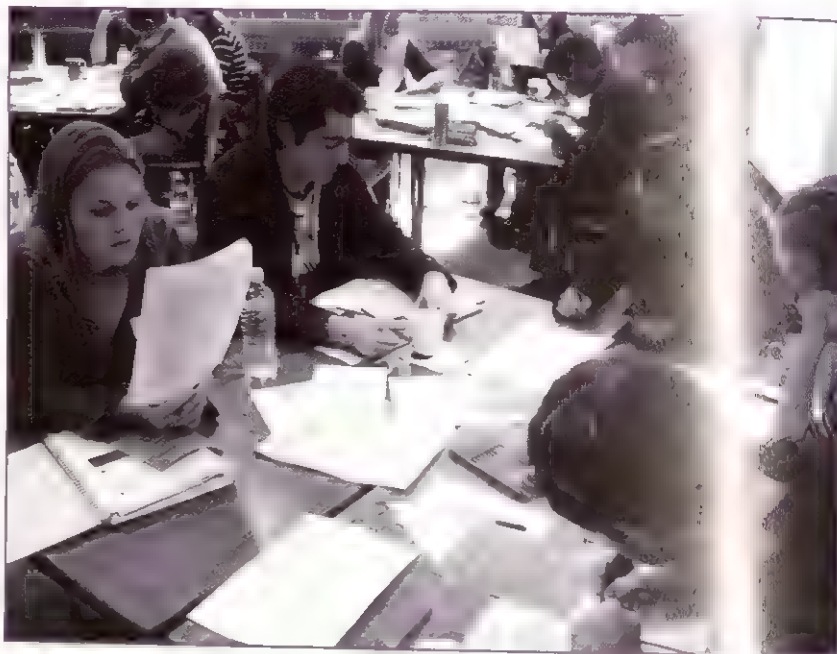
Developing Generic Guideline Standards in Sustainability

The National Centre for Sustainability at Swinburne University of Technology has recently commenced a project to develop generic guideline standards for sustainability for use in Training Package development and review³⁴¹. The project is being conducted on behalf of ANTA under a Memorandum of Understanding with EcoRecycle Victoria and the NSW Department of Environment and Conservation.

■ Box 5.65

Researching How Workers Learn

The research of Crina Virgona and Peter Waterhouse³⁴² is highly relevant to learning for sustainability particularly for VET as it explores how workers learn. They found that the primary context for the development of skills is work, and that the primary mode of acquisition is experiential learning. The world of work shapes professional identity and helps to define and refine values. Their research shows that workplace culture can be instrumental in generic skills development and that professionals should maximise opportunities for experiential learning³⁴³. There is a need to build and nurture workplaces as learning organisations. This thinking is closely aligned with learning for sustainability approaches.



■ Box 5.66

Reframing the Future

Sustainability is agreed to be an important issue for Western Australia and for Challenger TAFE. This project adopts the notion of strategic management as a vehicle to embed sustainability principles into the Training Packages delivered at Challenger TAFE.

'The anticipated outcome of the project is a step forward for the WA Horticulture & Environmental Science Skills Centre of Challenger TAFE, towards its Strategic Planning Framework for 2004-2009 goal of 'supporting the implementation of the State Sustainability Strategy'. This Reframing the Future project provides us with the opportunity to work towards some practical solutions to a very complex issue that has been largely overlooked or minimized in VET training.'

Reframing the Future (2004)

vii) Competency Based Training

In Australia, competency-based training has been gaining ground in universities and colleges over the past 10 years. In 1990, the Australian Government has informed teacher education programs (including EE)³⁴⁹. It has been one of the most defining features of VET reform in the 1990s. This reform has been characterised by a move from a content-focused curriculum with an emphasis on learning outcomes to competency-based learning through national Training Packages. Training Packages are developed under the National Training Framework and provide the 'architecture' of the VET system. They specify the competencies that must be acquired, as demonstrated, the industry standards for assessment and the resulting qualifications (see Box 5.67).

A recent national high level review of Training Packages undertaken by ANTA has reaffirmed their status within the VET system³⁵⁰. For at least the next decade, Training Packages will be the primary model for delivery of vocational education and training³⁵¹. On average 56% of VET hours delivered nationally is Training Package based with this figure steadily rising³⁵². Training Packages therefore are an essential consideration for those concerned with learning for sustainability in VET.

Current Approaches to Sustainability in Training Packages
Training Packages provide a useful nation-wide framework for the adoption of cross-curricular education concepts such as learning for sustainability approaches to

education³⁵³ (see Box 5.68). In addition, a competency-based system that is outcomes-driven rather than content-focused allows greater flexibility in curriculum and teaching approaches. This creates opportunities for innovation in the teaching and learning of sustainability principles within the vocational setting³⁵⁴ and underlines the need for professional development that equips trainers with the skills to deliver innovative teaching. It also allows the process of learning for sustainability in VET to be contextual and reflect the dynamics of different audiences and issues.

The Training Package model encourages learners to draw on their broader 'life skills' and to engage in lifelong learning to ensure workforce skills are continually updated³⁵⁵. The transferability of units of competency across Training Packages also enables greater cross-industry adoption of the 'generic' skills required for employability and change towards sustainability³⁵⁶. The high level review of Training Packages undertaken by ANTA has reaffirmed the importance of incorporating generic skills into the employability skill set. Skills in 'critical' reflection, problem-solving, decision-making, conflict resolution, strategic planning and self-management have been stressed as important in this review³⁵⁷. These are highly congruent with the skills required for change towards sustainability³⁵⁸.

The efficacy of training packages however, is the subject of considerable debate in VET. It has been argued,

■ Box 5.67 Training Packages in VET

'Training Packages reflect some of the most fundamental principles and policies on which the national VET system has been built.'

ANTA (2004d, p. 3)

Their role has been described as follows:

- 'To help the VET system achieve a better match between skills demand and supply;
- To encourage flexible and relevant workforce development and learning;
- To provide for the national recognition of the vocational outcomes of learning; and
- To guide and support individuals in their choice of training and career.'

ANTA (2004d, p. 15)

■ Box 5.68 Adapting to Sustainability

'As industry continues to respond to community concerns and government legislation and incentives to adopt ESD principles, there is a corresponding need for vocational education to accommodate these trends.'

Russell (2003, p. 9)

■ Box 5.69

Cross-Industry Training Packages

'If Training Packages remain as the vehicle for delivery in VET, together with AQTF requirements for the use and development of units of competency, then it would appear necessary to develop a cross-industry Training Package for the 'environment industry'. The challenge would be to obtain cross-industry agreement and mutually agreed sponsorship of such a package.'

Peterson (2004, p. 6)

■ Box 5.70

Environmental Content in Vocational Education and Training

A study undertaken by TAFE NSW³⁶⁵ identified the following issues:

1. Some of the Training Packages examined include elective environmental units of competence that can be ignored in delivery;
2. Compliance to legislative requirements is a strong focus of environmental units of competence; more accurately - 'Environmental units of competence are often limited to legislative requirements and ignore best practice options to exceed compliance';
3. Reflecting this compliance focus, Training Packages for traditionally 'dirty' industries such as oil refining or mining pay the greatest attention to environmental issues;
4. Some Training Packages included environmental content which is irrelevant for the target audience;
5. Government agencies with an environmental focus and expertise tend to be unaware or not involved in national Training Package development and review processes;
6. The adoption of EE policies and curricula in the schools sector has not been picked up in VET through national Training Package development and review; and
7. A professional development strategy in sustainability is required for TAFE teachers and curriculum developers.

for instance, that competency-based training and industry-dominated training packages tend to reproduce the productive practices that contribute to environmental problems, and fragment the knowledge and skills required for sustainability into compartmentalised, decontextualised and measurable units. A more integrated, holistic and inclusive approach to curriculum design, learning and assessment in VET has been advocated as a means to develop a more critical environmental literacy and authentic ecological competence among the workforce³⁵⁹.

The development process for Training Packages is managed through Industry Training Advisory Boards (ITABs) and the recently established Industry Skills Councils (ISCs). Stakeholders have always been welcome to make submissions or otherwise contribute to this process. Generally the process tends to be dominated by input from traditional industry sectors which has the effect of overlooking the needs of new and emerging 'green' industries. In addition to this, other stakeholders concerned with sustainability issues often pass up the opportunity³⁶⁰. One of the major areas for action agreed by the National Training Quality Council in response to the High Level Review of Training Packages is to ensure 'rigorous and inclusive development and review processes apply'³⁶¹.

The system is quite rigidly structured with the result that emerging specialisms, such as environmental management are often not captured within Training Packages³⁶². This has been revealed in research by Kim Peterson who identified the lack of Training Packages dedicated to environmental management skills³⁶³ (see Box 5.69). A similar issue, is the gap identified in existing Training Packages associated with the environmental impact of work practices and issues relating to the sector³⁶⁴.

Since the recent introduction of Training Packages, the quality and coverage of the Training Packages has improved over time and continues to evolve following the review established by the High Level Review.

Where units of competency do recognise environmental considerations³⁶⁶, they usually relate to compliance with regulatory requirements. For example, a review of the 10 Services Training Packages identified 730 units of competency with 'compliance management'. Over half of these units deal with the compliance areas of OH&S, leaving a significantly smaller proportion dealing with environmental protection. The broader notion of sustainability and its issues are rarely addressed.

Some training organisations have responded to the need to address sustainability issues by developing their own courses. These courses often consist of units of competency packaged together from existing Training Packages. Several individual Training Packages include segments that relate to environmental vocations³⁶⁸. These include Asset Maintenance (Waste Management), Water, Industry, Conservation and Land Management, Rural Production, Amenity Horticulture and Local Government. There are also relevant units of competency in the Business Services, Chemical, Hydrocarbons and Oil Refining, Plastics, Rubber and Cable-making, Manufactured Mineral Products and Laboratory Operations Training Packages³⁶⁹.

A study conducted by TAFE NSW in 2002 aimed to identify gaps in national Training Packages and to develop resources to assist with the integration of environmental content into TAFE NSW offerings³⁷⁰. This project involved a review of ten National

Training range of develop teachers specific and the environ Package es. It identified a and resulted in the EE resources for ing within VET (see Box 5.71 study also made very endations to ANTA on how to address content in Training Package pment (see Box 5.71).

The av. y of specific focused education cent development examples include the *Graduate Certificate in Ecologically Sustainable Development* offered by TAFE NSW and the *Graduate Certificate in Sustainability* offered by the TAFE Divisions of Swinburne University of Technology. VET courses of this type draw from existing Training Packages. Some have involved the development of additional modules in order to meet emerging policy directives in EE sustainability, such as the *National Action Plan for Environmental Education* and *NSW Environmental Education Plan 2002-2005*¹⁷².

Learner Choices and Training Packages

The notion of a lifelong learning policy is permeating all forms of education. VET learners are already displaying a willingness to engage in the practice of lifelong learning. Faced with growing uncertainty, flexibility and mobility in employment, lifelong learning is already a reality for many VET learners³⁷⁴. Both Damon Anderson³⁷⁵ and Kaye Schofield³⁷⁶ have observed that workers are adapting to change through new careers facilitated by VET courses and qualifications.

Box 5.71

Environmental Content in Vocational Education and Training

This study made the following recommendations to ANTA:

- 'Strengthen the current statements in the ANTA *Training Package Developer's Handbook* referring to the inclusion of environmental content, and ensure that Training Package developers apply the guidelines provided in the handbook more rigorously.
- Require contractors engaged in the review of Training Packages to incorporate sector-specific environmental issues into relevant units of competence.
- Require that environmental content in Training Packages should not be limited to compliance with legislation, but should be adequate to ensure that learners in all industry sectors achieve the skills and knowledge related to minimising the environmental impacts of their workplace practices.
- Ensure that Training Package developers and contractors have current expertise in the environmental impacts of the industry sector for which they are developing a package, and the options for minimising those impacts.
- Support the recommendation of this report that National ITABs remedy any identified environmental content gaps in Training Packages.
- Include *Characteristics of Environmental Learning Outcomes* in *Training Package Developer's Handbook* for use as a tool by Training Package developers.
- Include the following in any update of the Handbook and on ANTA's website:
 - A contemporary reference list of appropriate environmental agencies and organisations.
 - A contemporary list of generic environmental competency units that have been developed for various industry sectors.'

It also suggested the following measures to National ITABs:

1. 'National ITABs should ensure that National Training Package developers have expertise in:
 - The environmental impacts of their industry sector; and

- Current options for impact minimising practices.

2. National ITABs should require that units of competence, elements or performance criteria developed in future Training Packages address:
 - Investigation of the relevant environmental impacts;
 - Consideration and implementation of alternatives to harmful practices;
 - Planning for minimal impact and continuous improvement;
 - That these concepts are adapted according to the AQF level of the unit; and
 - The range of variables associated with these units of competence should list possible impacts, alternative practices and possible auditing, planning and implementation approaches.
3. National ITABs should adopt the following approach when packaging units of competence into qualifications.
 - The core units at AQF Levels II and III should ensure all learners have a fundamental awareness of the environmental impact of their work practices and a sense of responsibility for minimising impact.
 - The inclusion of core units at AQF Levels IV, V and VI dealing with Environmental Management Systems and sustainability concepts relevant to the sector.
 - The integration of environmental content into competency elements and performance criteria in all relevant units, reinforcing awareness of the need to minimise negative environmental impacts.
4. National ITABs should ensure that future consultation processes for the development and review of National Training Packages include stakeholders with relevant expertise and whose role is to address environmental issues for industry sectors.'

Russell (2003, p.17-19)

■ Box 5.72

Individual Learning Pathways

'But individual learners are not following linear pathways anymore. They 'swirl' - dropping in and out of different learning sites and institutions and transferring freely between them, study and work. Linear pathways embodied in traditional models of learner progression from education to work, as conceived by policy makers, no longer apply. Learners are increasingly constructing their own routes - formal and informal - according to their own needs, aspirations and circumstances and assuming greater responsibility for their own employability.'

Schofield (2003, p. 150)

■ Box 5.73

Conservation and Land Management Support Guide

The support guide provides teachers with information and advice on how to deliver this new Training Package in a way that that builds student capacity to address sustainability issues.

The recommendations made include:

- discuss sustainability issues in class;
- encourage students to understand the concepts and take them into industry/employment with them;
- highlight current best practice; and
- implement best practices in your office/teaching environment.

National Centre for Sustainability, Swinburne University of Technology (2003, p. 11)

This support guide was developed with teachers and the Providers Network in Victoria for the CLM Training Package. This encouraged adoption and built teachers' skills in sustainability.

The significance of this phenomenon to learning for sustainability is currently unexplored. Whilst the evidence suggesting that VET learners are adopting lifelong learning practices is positive, this must be balanced with the potential risks. ANTA notes that half of all VET students successfully complete only part of a qualification rather than a full qualification³⁷⁷ (see Box 5.72). The implication for learning for sustainability is that it should be integral to all VET offerings, not only in specific qualifications, and should be equally accessible to all learners. The need to develop generic skills and attitudes for sustainability among the whole workforce, rather than rely solely or primarily on individual employees with specialised technical expertise, provides another compelling argument for adopting an integrated or across-the-curriculum approach to the development of work-related skills for sustainability³⁷⁸.

Potential to Address Learning for Sustainability through Training Packages

The potential of Training Packages to address sustainability issues is being realised by some. The National Centre for Sustainability at Swinburne University has developed a guide to support the implementation of the *Conservation and Land Management (CLM) Training Package*. This guide provides advice to teachers on how to align their teaching with the principles of sustainability³⁷⁹ (see Box 5.73). This project was funded through the 'Reframing the Future' program and was an action-based learning project working with all staff from the *CLM Training Package* as well as from the Victorian Providers Network for the training package. A comprehensive 'Education for Sustainability Professional Development Kit'³⁸⁰ for TAFE teachers has also been developed at Swinburne University through the National Centre for Sustainability.

Despite the recent re-endorsement of the Training Package model in Australia, some have questioned whether Training Packages can deliver the depth of change required for sustainability and the ongoing changes in the world of work. David C. Phillip McKenzie³⁸¹ have argued that the capacity of the current VET system to equip workers for the complexity of change involved is limited. It has also been proposed by Wheeler that Training Packages are not suitable for preparing workers for continual change as learners do not acquire the essential 'learning to learn' necessary for responding and adapting to continual change. These arguments suggest the need for innovation in the VET system in order for it to accommodate the fluctuating demands of the globalised economy as a response to change for sustainability.

Damon Anderson³⁸² has gone further to suggest that VET is directly involved in perpetuating current unsustainable levels of economic growth. He argues that the current VET system prioritises industry needs over others and that VET reinforces the concept of employment as the principal indicator and measure of social worth. These are contributing factors to sustainability issues and suggest the need for reform in the VET system, supported by a broad process of social change.

These arguments indicate that the current Training Package model may prove inadequate to engage stakeholders in the learning required for change towards sustainability. This would suggest that policymakers should not rely solely on Training Package reform to secure sustainability outcomes. Other integration and intervention strategies beyond Training Packages could be developed and explored³⁸³.

5 Summary of Needs and Recommendations

Further and higher education has a valuable contribution to make to Environmental Education thought and practice. This document provides a national overview of Environmental Education and its contribution to sustainability in the education sector across Australia. It forms part of a series prepared by the Australian Research Institute in Education for Sustainability (ARIES) for the Australian Government Department of the Environment and Heritage. The report consolidates previous studies as well as reviews previous and emerging trends in further education (often referred to as Vocational Education and Training, VET) and higher education. It provides a snapshot of the current context and experiences within universities, colleges and state registered training organisations (such as TAFEs) so as to inform future work in this area.

Sustainability is increasingly becoming a mainstream issue for further and higher education institutions and has been identified as one of the biggest challenges to face this sector in the 21st century. Sustainability in this sector cuts across the core functions of teaching, research and management operations. The implementation of learning for sustainability approaches to Environmental Education has implications for institutional culture as it calls for changes in the decisions, procedures and actions of the further and higher education sector.

Although training institutes, colleges and universities have different traditions and modes of operation,

the issues they face with regards to sustainability and learning for sustainability approaches are closely aligned. Many of these education institutions are currently approaching sustainability through campus greening (offering recycling facilities and energy and water efficiency programs) and a few through the integration of environmental knowledge into existing courses/training packages. While these efforts are a first step and should be applauded, sustainability experts are pushing institutions to address the broader notions of learning for sustainability.

Internationally, this sector is working towards sustainability not only across campus management and operations, but also in policy, curriculum, pedagogical approaches and research activities. A holistic process of institutional learning for change is considered best practice. There is much to learn from overseas experience in this sector.

The sector is experiencing a drive towards a generic skills agenda which could act as a vehicle for engaging with sustainability across the disciplines and training packages. This agenda offers great potential for addressing 'critical' thinking skills, values clarification skills and stakeholder engagement skills, which are often associated with learning for sustainability and are not systematically addressed by current courses or programs.

Recently, TAFEs, colleges (and some universities) are increasingly recognising

the need to engage industry and other external stakeholders in defining course outcomes or competencies so that these address relevant social needs. Greater opportunities for sharing best practice between local government, business and industry and this sector now also exist. Commentators argue that this dialogue needs to be strengthened through more formal partnerships as it has great potential to drive change towards sustainability and to ensure that education and training is more relevant - particularly to the needs of employers and the changing nature of work.

A point of divergence between further and higher education is who determines *what* and *how* students learn. Further education is increasingly focused on competency-based training through national training packages. These training packages specify the competencies that must be learned, the industry requirements for assessment and the resultant qualifications. They are created by course developers and not by those who teach these courses. In universities, divisional committees approve the general aims, subject and generic outcomes of course, but it is the teaching staff who pull the course together and who exercise a great deal of control over *what* and *how* students learn. This has implications for how we build capacity for sustainability across the sector. Strategies for curriculum change in further education must differ from those currently being piloted in higher education.

A growing number of education institutions have signed national

and international sustainability declarations. These declarations often present a vision for sustainability in higher and further education and encourage specific practices. Many struggle to fulfil these commitments through institutional policies and implementation plans. Questions arise regarding academic and general staff's understandings of sustainability and learning for sustainability principles, as well as the capacity for innovation within institutions, which are often accused of being slow to respond to social trends. While declarations are of some value in providing direction, they need to be accompanied by a process of institutional strengthening and professional development in order for their principles to be translated into practice.

To enhance further and higher education's contribution to sustainability, environmental education initiatives need to:

- Establish whole of institutional approaches to learning based change for sustainability. This should include campus management, curriculum, research, outreach and operations through an organisational learning approach;
- Build the capacity of staff (academic, administrative and facilities management staff) in sustainability and learning for sustainability; and

- Establish partnerships between institutions and with business, government and non-government organisations to strengthen and share experiences in sustainability and learning for sustainability.

Recommendations

The research undertaken by ARIES has revealed a number of key needs in areas related to greening the campus, the curriculum, commitments to sustainability, institutional learning for change, generic skills and competency based training. The following recommendations have been derived from these key needs. The recommendations identify practical steps at a policy, practice and research level that could strengthen the contribution of Environmental Education towards sustainability within the further and higher education sector.

Policy:

1. **Establish a National Council on Sustainability in Further and Higher Education** to develop and implement a **national strategy and action plan** on learning for sustainability approaches in further and higher education. It should also play a key lobbying role - advocating and creating opportunities for environmental education and sustainability across the sector.

The Council would involve the Australian Vice-Chancellors' Committee, the Australian Government Department of Education, Science and Training, the Industry Skills Councils, the Australasian Campus Union Manager's Association, the National Tertiary Education Union, and the National Union of Students.

The national strategy and action plan needs to be aligned with existing strategies such as the *Australian Quality Training Framework*⁹ as well as other developments such as the Research Priorities. The Council should engage with key sector institutions such as Australian universities, quality assurance processes or VET's employability framework.

2. **Provide incentives (such as grants)** to further and higher education institutions to develop and implement **institutional policies and action plans** on sustainability and learning for sustainability approaches. These should be aligned with the national strategy outlined above and promote institutional learning and action for sustainability.

Practice:

3. Develop a process of **rating institutional progress** towards sustainability and learning for sustainability. The international review and benchmarking tool outlined in recommendations 9 and 10 could assist in this task. The institutions, which have achieved a high rating could be rewarded with a **prize** from the proposed National Council on Sustainability in Further and Higher Education (see recommendation 1).

For example, a process similar to that undertaken by the Corporate Responsibility Index for businesses could be adopted. The **Corporate Responsibility Index**¹⁰⁵, which has incorporated the **Global Reporting Initiative**¹⁰⁶, benchmarks participating businesses on their social responsibility within the spheres of community, workplace, marketplace and environment.

4. Encourage Australian education institutions to establish strong **partnerships with GHESP** to identify, create and disseminate widely available internet, in print, through seminars and/or development of a toolkit, effective strategies, **models and good practice** for sustainability in higher and further education.
5. To actively/reward institutional change for change. **Establish an accreditation scheme** for further and higher education institutions to acknowledge competencies and professional development in learning for sustainability. For example, in higher education the scheme could recognise those who a) include stakeholders from business, government and non-government organisations in institutional and curriculum development; b) promote connected learning; and c) create *for* and not just *about* sustainability.
6. Provide a national professional development program for **campus environmental and sustainability managers** on sustainability and learning for sustainability approaches. The campus management for sustainability resource identified in recommendation number 13 could form the basis of the program.
7. Document the experiences of **action research projects in curriculum change for sustainability**. This would document the results of the action research project described in recommendation 10. This resource should focus particularly on the processes by which researchers are engaging in change. It would provide support material for others planning change within this sector.

Research:

8. Undertake an **international review and assessment of progress in institutional learning** for sustainability. This research should be focused particularly on curriculum, research, outreach and management. The findings should be published in a resource that supports institutions with practical examples of strengths, weaknesses, opportunities and limitations of institutional change for sustainability.
9. The review identified in recommendation 8 could be used to **develop a benchmarking tool** for a whole of institution approach to sustainability. This tool could be based upon a triple bottom line approach, encompassing campus management and operations, curriculum and research.
10. Undertake an inter-institution **action research project with university teaching staff** to integrate learning for sustainability principles and processes into **curriculum**, whilst identifying and 'removing' barriers to change, and determining how transformative change can be achieved. This could extend the work undertaken by projects such as ACTS and could be area specific, e.g. design and architecture; commerce and finance; and building and trade.
11. Undertake a **participatory needs assessment** in sustainability for **specific industry sectors** through stakeholder dialogue. In VET this could be done in partnership with the Skills Councils and could be used to inform the reviews of training packages. At the university level, this could be undertaken in partnership with bodies which accredit courses such as planning, architecture, engineering etc.
12. The participatory needs assessment, as identified in recommendation 11, would inform the construction of a framework of **key generic skills** in sustainability, which could be used by **developers of training packages in VET** to address sustainability and learning for sustainability approaches. The framework could be constructed and/or trialled through participatory research involving key stakeholders. This framework could potentially be incorporated within the broader framework of Employability Skills developed by BCA and ACCI.
13. Undertake **research and document experiences** of innovation in successful and effective **campus management** for sustainability. This resource should be practical in nature offering campuses suggestions of how they can integrate sustainable design and management of their own campuses. This resource should be targeted not only towards campus managers, but also toward students unions and others with a stake in campus management.

Endnotes

- ¹ This sector includes formal education institutions, universities and Registered Training Organisations, such as Technical and Further Education (TAFE) and Adult and Community Education providers.
- ² Carpenter and Meehan (2002)
- ³ University Leaders for a Sustainable Future (1990)
- ⁴ ACTS (2004b)
- ⁵ UNSW, RMIT, ANU, Melbourne University, University of Technology, Sydney, University of Canberra, University of Sunshine Coast and UWS have all signed the Talloires Declaration.
- ⁶ Many Australian universities offer qualifications in the field of the environment and sustainability. Some integrate subjects and lectures relating to these fields into other qualifications such as business studies.
- ⁷ Tilbury (2004); Sterling (2004)
- ⁸ Yencken et al (undated)
- ⁹ Tilbury (2004)
- ¹⁰ UNSW (2004d); ANU (2004j)
- ¹¹ University of Technology, Sydney (2004a); ANU (2004a); ANU (2004c)
- ¹² Monash (2004a)
- ¹³ Clugston and Calder (1999)
- ¹⁴ Sterling (2004); Anderson (2003a); Dovers (2001)
- ¹⁵ IUCN (2002)
- ¹⁶ WWF China Education Programme (2002)
- ¹⁷ Parliamentary Commissioner for the Environment (2004)
- ¹⁸ UNESCO (2002b)
- ¹⁹ UNESCO (2002b)
- ²⁰ National Centre for Sustainability (undated)
- ²¹ UNESCO (2002a)
- ²² UNESCO (2002a)
- ²³ Tilbury et al (2005) This contains a section outlining teacher education for sustainability in the formal and higher education sectors.
- ²⁴ Also see Volume 2 of this Series *A National Review of Environmental Education and its Contribution to Sustainability: School Education*.
- ²⁵ Department of the Environment and Heritage (1992)
- ²⁶ Department of the Environment and Heritage (2000)
- ²⁷ Government of Western Australia (2003a)
- ²⁸ Government of Victoria (2005)
- ²⁹ NSW Government (2002)
- ³⁰ The ANTA will be defunct as of July 2005, where the Department of Education, Science and Training will have to administer ANTA's current roles and responsibilities.
- ³¹ ANTA (2004)
- ³² It should be noted that the reference to sustainability in VET National Strategy 'Shaping our Future' is not defined within the document, although this document provides an opportunity to implement education for sustainability.
- ³³ Department of Education, Science and Training (2004b)
- ³⁴ For all universities except Australian National University, which was established under an Act of Federal Parliament.
- ³⁵ ANTA (2004a)
- ³⁶ Tilbury and Cooke (2001); Anderson (2003b)
- ³⁷ Yencken et al (2004); Bekessy et al (Undated)
- ³⁸ Department of Education, Science and Training (2004c)
- ³⁹ AUQA (2004)
- ⁴⁰ Goozee (2001)
- ⁴¹ ANTA website accessed 22/12/04 (www.anta.gov.au/Inkadvisory.asp)
- ⁴² University Leaders for a Sustainable Future (2004)
- ⁴³ Tilbury (2004)
- ⁴⁴ International agreements specifically relating to sustainability in the further and higher education sector include the Talloires Decl. (1990); Swansea Declaration (1993); Copernicus Charter (1994); the Luneburg Declaration (2001)
- ⁴⁵ Lotz-Sisitka (2004b); UNESCO (2002a)
- ⁴⁶ Sustainable Development Education Panel (2002a)
- ⁴⁷ Parliamentary Commissioner for the Environment (2004)
- ⁴⁸ Rensburg et al (2001)
- ⁴⁹ Anderson (2003b)
- ⁵⁰ The review does not seek to dissect the EE experience into isolated parts, instead, it identifies key 'hooks' that help us hang the rest of what is happening within the further and higher education sector. These themes do not identify the outcomes or impact of EE in the sector since this is beyond the scope of the report. Empirical evaluation and longitudinal research is required to identify the achievement of changes resulting from EE.
- ⁵¹ Bekessy et al (undated)
- ⁵² University of Technology, Sydney (2001)
- ⁵³ Lenzen and Murray (2003)
- ⁵⁴ Calvo et al (2002)
- ⁵⁵ UNSW (2000)
- ⁵⁶ Unknown Author (2004)
- ⁵⁷ ANU (2004d)
- ⁵⁸ Stroud (2001)
- ⁵⁹ ANU (2004e)
- ⁶⁰ Monash University (2004b)
- ⁶¹ UNSW (2004b)
- ⁶² ANU (2004h)
- ⁶³ Melbourne University (2004)
- ⁶⁴ UNSW (2004c)
- ⁶⁵ Tilbury (2004); Sterling (2004); Sharp (2002)
- ⁶⁶ Thomas (2004)
- ⁶⁷ ANU (2004d)
- ⁶⁸ ANU (2004e)
- ⁶⁹ Seven universities are Signatories to the Australian Greenhouse Challenge. These universities are: Australian National University, Monash University, Murdoch University, RMIT University, University of New South Wales, University of South Australia and University of Western Australia
- ⁷⁰ Calvo et al (2002)
- ⁷¹ Lenzen and Murray (2003)
- ⁷² Bekessy et al (undated)
- ⁷³ UNSW (2004c); ANU (2004c)
- ⁷⁴ Sterling (2001)
- ⁷⁵ Tilbury (2004)
- ⁷⁶ Green Building Council Australia (2004)
- ⁷⁷ Australian Building Greenhouse Rating (2004)
- ⁷⁸ Green Globe 21 (2004)
- ⁷⁹ Department of the Environment and Heritage (2004)
- ⁸⁰ See: <http://www.basix.nsw.gov.au/>
- ⁸¹ Sai Global (2004)
- ⁸² Global Reporting Initiative (2004)
- ⁸³ AccountAbility (2004)
- ⁸⁴ CSIRO (2004)
- ⁸⁵ Energy and Technical Services (2004)
- ⁸⁶ Australian Greenhouse Office (2004)
- ⁸⁷ Ecological Footprint is an accounting tool that calculates the land needed to provide the resources we consume and to assimilate the wastes we discharge, indefinitely into the future. Expressed in hectares, our

- Eco. footprint allows us to measure the load we each place on the planet (Wackernagel and Rees, 1996).
- 88 Env. Protection Agency Victoria (2004)
- 89 Assoc. of Universities in Australia (2004)
- 90 Corp. Innovation (2004)
- 91 Proj. Technology Consultants (2004)
- 92 LJ. (2004)
- 93 Eco. (2004)
- 94 UN. Monash University, ANU, and University of Sydney have filled such positions.
- 95 TI. (2004b)
- 96 TE. (2004a)
- 97 TE. (2004a)
- 98 Ni. (2004)
- 99 S. (2004)
- 100 A. (2004b); UNSW (2004b); Monash University (2004b); Melbourne University (2004)
- 101 A. (2004)
- 102 H. and Sterling (1996)
- 103 U. Nations (2002); United Nations (2002)
- 104 C. (2002)
- 105 M. University (2004a); Students at Macquarie (2003)
- 106 S. at Macquarie (2003)
- 107 C. (1998)
- 108 C. (1998)
- 109 J. and Sterling (1996)
- 110 A. (2004a)
- 111 A. (2004a)
- 112 S. (2003)
- 113 C. (2002); Sharp (2002)
- 114 F. of the Built Environment UNSW (2004)
- 115 B. et al (undated)
- 116 H. (2004) personal communication via telephone. Bek Hammed is Environment Officer with the National Union of Students.
- 117 H. (2004) personal communication via telephone. Bek Hammed is Environment Officer with the National Union of Students.
- 118 Monash Environment Institute (2004)
- 119 U. NSW; ANU and Melbourne University are also participating in the Green Office Program.
- 120 Monash Environment Institute (2004)
- 121 UNSW (2004b); University of Technology, Sydney (2004b); ANU (2004f); Monash (2004b); Melbourne University (2004)
- 122 Center for Ecosystem Management (2003)
- 123 Tilbury (2004) Sterling (2004);
- 124 Gudz (2004)
- 125 Fien (1993); Forum for the Future (1999)
- 126 University Leaders for a Sustainable Future (1990)
- 127 University Leaders for a Sustainable Future (1990)
- 128 United Nations Educational Scientific and Cultural Organisation (1992); United Nations (2002)
- 129 Tilbury (2004); Anderson (2003a,b)
- 130 UNSW (1999)
- 131 Tilbury (2004)
- 132 Tilbury, Crawley and Berry (2005)
- 133 Tilbury, Crawley and Berry (2005)
- 134 Tilbury, Crawley and Berry (2005)
- 135 Tilbury (2004)
- 136 Sterling (2004)
- 137 Huckle and Sterling (1996); Sterling (2001)
- 138 Sterling (2004); Anderson (2003a)
- 139 Huckle and Sterling (1996); Fien (1993); Tilbury (1993); Tilbury (2003)
- 140 Adapted from Berrill and Giffard (2001)
- 141 Fien, Heck and Ferreira (1997)
- 142 Tilbury, Podger and Reid (2004)
- 143 Bubna-Litic (2004)
- 144 Tilbury and Cooke (2001)
- 145 Tilbury and Cooke (2001)
- 146 Kent (2004)
- 147 Tilbury, Crawley and Berry (2005)
- 148 Watkin et al (1995)
- 149 Watkin et al (1995)
- 150 Alabaster and Blair (1996)
- 151 Alabaster and Blair (1996)
- 152 Tilbury (2004)
- 153 Anderson (2003b)
- 154 OECD (1991); Fien et al (1997)
- 155 Tilbury (2004)
- 156 ACTS (undated)
- 157 Podger (2004) personal communication via meeting.
- 158 ACTS (undated)
- 159 London South Bank University (2004)
- 160 Tilbury (2004)
- 161 See: <http://www.gse.mq.edu.au>
- 162 See: <http://www.griffith.edu.au/academicprogramsandcourses/>
- 163 Harvard Gazette (2003)
- 164 Thomas and Nicita (2002); Anderson (2003b)
- 165 Tilbury (2004)
- 166 Tilbury (2004)
- 167 Sterling (2004); Tilbury (2004); Huckle (2004); Pittman (2004)
- 168 Tilbury (2004)
- 169 Wright (2002); Wright (2004)
- 170 Wright (2004); Tilbury (2004)
- 171 University Leaders for a Sustainable Future (1990)
- 172 IAU (1991)
- 173 IAU (1993)
- 174 IAU (1993a)
- 175 Copernicus (1994)
- 176 Global Higher Education Partnership for Sustainability (2001)
- 177 Science Council of Japan (2002)
- 178 University Leaders for a Sustainable Future (1990)
- 179 University Leaders for a Sustainable Future (1990)
- 180 IAU (1991)
- 181 IAU (1993)
- 182 University Leaders for a Sustainable Future (1990)
- 183 IAU (1993)
- 184 United Nations Educational Scientific and Cultural Organisation (1992)
- 185 Wright 2004
- 186 Wright 2004
- 187 Goteborg University (2001)
- 188 Wright 2004
- 189 Science Council of Japan (2002)
- 190 Corcoran and Wals (2004)
- 191 Australian Greenhouse Office (2004)
- 192 ACTS (2004a)
- 193 University Leaders for a Sustainable Future (1990)
- 194 Sterling (2004); Tilbury (2004); Sharp (2002); Gudz (2004).
- 195 ANU (2004g); University of Technology, Sydney (2004b); Gudz (2004).
- 196 Bekessy et al (undated)
- 197 Wright (2004); Thomas (2004)
- 198 ANU (2004g)
- 199 University of Technology, Sydney (2004a); University of Technology, Sydney (2004b)

- 200 Bekessy et al (undated)
- 201 University Leaders for a Sustainable Future (2004)
- 202 Wright (2002); Wright (2004)
- 203 While some distinguish between institutions and organisations the terms will be used interchangeably for the purposes of this research. For example, Stephen Dovers (2001) has described an institution as an underlying pattern of rules and behaviour, whereas an organisation is a more changeable manifestation of those institutional arrangements.
- 204 University Leaders for a Sustainable Future (1994); Orr (1994); Cortese (1999); Filho (1999)
- 205 Bekessy, et al (2004)
- 206 Creighton (1998); Corcoran & Wals (2004)
- 207 Huckle and Sterling (1996); Sterling (2004); Tilbury (2004); Anderson (2003b)
- 208 Sterling (2004); Tilbury (2004); Calvo et al (2002)
- 209 Sterling (1996); Sterling (2004)
- 210 Dovers (2001)
- 211 Sterling (2004); Tilbury (2004)
- 212 United Nations Educational Scientific and Cultural Organisation (1992)
- 213 Gudz (2004); Sharp (2002)
- 214 Tilbury (2004)
- 215 Adapted from Dovers (2001) and Senge (1990)
- 216 Sterling (1996);
- 217 Corcoran and Wals (2004)
- 218 Fien (1993)
- 219 Tilbury (2004)
- 220 Senge (1990); De Geus and Senge (1997); Bateson (1999)
- 221 Huckle and Sterling (1996); Fien (1993); Tilbury (2004)
- 222 IUCN (2002)
- 223 Huckle and Sterling (1996); Fien (1993); Tilbury (2004)
- 224 Dovers (2001); Dunphy, Griffiths and Benn (2003)
- 225 United Nations Educational Scientific and Cultural Organisation (1992); United Nations (2002)
- 226 Lotz-Sisitka (2004)
- 227 Tilbury (2004)
- 228 Downey (2004)
- 229 United Nations Educational Scientific and Cultural Organisation (1992); United Nations (2002)
- 230 Lotz-Sisitka (2004)
- 231 Tilbury and Cooke (2001)
- 232 Department of the Environment and Heritage (2001)
- 233 Department of the Environment and Heritage (2001)
- 234 Tilbury and Cooke (2001)
- 235 ACTS (undated)
- 236 University of Technology, Sydney (2004a); University of Technology, Sydney (2004b); UNSW (2004a); UNSW (2004b); Monash University (2004a); Monash University (2004a); Monash University (2004b); ANU (2001)
- 237 Yencken et al (undated)
- 238 Thomas (2004)
- 239 Hicks and Holden (1995); Tilbury (2004); Anderson (2003b)
- 240 Hicks and Holden (1995); Tilbury (2004)
- 241 Ali Khan (1996)
- 242 Yencken et al (undated)
- 243 Dovers (2001)
- 244 De Geus and Senge (1997); Senge (1990); Dovers (2001); Sterling (2004)
- 245 De Geus and Senge (1997); Dunphy, Griffiths and Benn (2003)
- 246 Dunphy, Griffiths and Benn (2003)
- 247 Gudz (2004)
- 248 Creighton (1998)
- 249 Lotz-Sisitka (2004)
- 250 Gudz (2004); Sharp (2002); Sterling (2004)
- 251 Senge (1990)
- 252 Gudz (2004)
- 253 Gudz (2004)
- 254 Doppelt (2003)
- 255 Senge (1990)
- 256 De Geus and Senge (1997)
- 257 Argyris & Schon (1996)
- 258 Senge et al (2004)
- 259 Gudz (2004); Sharp (2002)
- 260 Mezirow (2000)
- 261 McCutcheon (1997)
- 262 Sharp (2002)
- 263 Sharp (2002)
- 264 Van Weenen (2000)
- 265 Dunphy, Griffiths and Benn (2003); Doppelt (2003)
- 266 Kemmis & McTaggart (1984)
- 267 Zuber-Skerritt (1996)
- 268 Pittman (2004)
- 269 Pittman (2004)
- 270 Pittman (2004)
- 271 Gudz (2004)
- 272 Gudz (2004)
- 273 Gudz (2004)
- 274 Gudz (2004)
- 275 Gudz (2004)
- 276 Gudz (2004)
- 277 Tilbury (2004)
- 278 Gudz (2004)
- 279 Gudz (2004)
- 280 Gudz (2004); Lotz-Sisitka (2004); Thomas (2004)
- 281 Gudz (2004); Lotz-Sisitka (2004); Thomas (2004)
- 282 Gudz (2004); Lotz-Sisitka (2004); Thomas (2004)
- 283 Thomas (2004); Thomas & Nicita (2002)
- 284 Tilbury (2004); Sterling (2004)
- 285 ANTA (2003a); Business Council of Australia (2004)
- 286 Robinson (2003); Waterhouse et al (1999)
- 287 Anderson, Brown and Rushbrook (2004)
- 288 Business Council of Australia (undated)
- 289 ACCI, ANTA, Business Council of Australia and Department of Education, Science and Training (2002)
- 290 ACTU (undated)
- 291 ANTA is the national government statutory authority charged with providing the framework for vocational education and training. ANTA reports to a Board, which consists of 4 industry representatives. This Board advises the Ministerial Council (MINCO) of Australian Government, state and territory Ministers responsible for vocational education and training.
- 292 Wooden (2002)
- 293 Wooden (2002), quoting ABS time series and ABS, Labour Force, Australia: Historical Summary 1966 to 1984.
- 294 Wooden (2002)
- 295 Wooden (2002)
- 296 Wooden (2002)
- 297 Fien (2004)
- 298 Watson et al (2003)
- 299 Wooden (2002)
- 300 Watson et al (2003)
- 301 Watson et al (2003)
- 302 Anderson et al (2004)
- 303 Lloyd and Payne (2002)

- 304 UN International Experts Meeting (2004)
- 305 Fien quoting UNESCO (1999, p.61)
- 306 Fien Anderson (2003a,b)
- 307 Ken Anderson (2003 a,b)
- 308 AN id, p.3)
- 309 Ken Ferrier (2001)
- 310 Bus Council of Australia (2004)
- 311 AN id)
- 312 AN 9a, p.7)
- 313 Bus Council of Australia (2004)
- 314 Bu Council of Australia (2004)
- 315 Bu Council of Australia (2004)
- 316 AN id-a)
- 317 AN id-a)
- 318 An et al (2004)
- 319 G Curtin (2004)
- 320 G Curtin (2004)
- 321 C McKenzie (2001, p.10) note that 'one of the key policy mechanisms for strengthening the linkages between education and the market has been the attempt to embed employability skills more fully in curricula and student assessment'.
- 322 C McKenzie (2001)
- 323 C (2004) notes that the Australian Education Council, Mayer et al 1992 recommended seven key competencies
- 324 C McKenzie (2001)
- 325 'The framework was developed through the Australian Chamber of Commerce and Industry and the Business Council of Australia's *Employability Skills for the Future*.
- 326 C (2004) notes that the Group consists of representatives from: the Australian Chamber of Commerce and Industry, the Enterprise and Education Foundation, the Ministerial Council on Education, Employment, Training and Youth Affairs Taskforce on Transition from School, the Australian Vice Chancellors' Committee, ANTA and the Australian Government Department of Education, Science and Technology
- 327 Curtis and McKenzie (2001) have described the types of personal attributes emphasised in international competency frameworks. They include self-esteem, personal ethics, capacity for self-management and responsiveness to feedback
- 328 Stealing (2001)
- 329 Virgona and Waterhouse (2004)
- 330 Virgona and Waterhouse (2004)
- 331 Anderson et al (2004); ANTA states that 'industry must have a pre-eminent role in defining work outcomes' (2004c, p.1)
- 332 OECD (2004)
- 333 Curtis and McKenzie (2001, p.35)
- 334 Learning and Skills Development Agency (2002)
- 335 Learning and Skills Development Agency (2002)
- 336 Learning and Skills Development Agency (2004)
- 337 Russell (2003)
- 338 National Centre for Sustainability, Swinburne University of Technology (2004)
- 339 NCFE (2004)
- 340 A NCVER funded research project being conducted by Jenny Kent (TAFE NSW) and Professor John Fien (Griffith University).
- 341 National Centre for Sustainability, Swinburne University of Technology (2004)
- 342 Virgona and Waterhouse (2004)
- 343 Virgona and Waterhouse (2004)
- 344 Curtis (2004)
- 345 Anderson, Brown and Rushbrook (2004)
- 346 Diplo (1998)
- 347 Julian (2004)
- 348 Reframing the Future (2004)
- 349 Fien and Tilbury (1996)
- 350 ANTA (2004d)
- 351 ANTA (2004d)
- 352 ANTA (2004d)
- 353 Learning and Skills Development Agency (2002)
- 354 Kent (2004)
- 355 Rumsey, D. and Associates Pty Ltd (2003)
- 356 Rumsey, D. and Associates Pty Ltd (2003)
- 357 Rumsey, D. and Associates Pty Ltd (2003)
- 358 Kent (2004)
- 359 Anderson (2003b)
- 360 Ferrier (2001); Russell (2003)
- 361 ANTA (2004d)
- 362 Peterson (2004) notes that there is no training package coverage for the vocation of environmental technician.
- 363 Peterson (2004)
- 364 Ferrier (2001); Russell (2003);
- 365 Russell (2003)
- 366 ANTA's Training Package development guidelines suggest consideration of environmental management.
- 367 Rumsey, D. and Associates Pty Ltd (2003)
- 368 Peterson (2004)
- 369 Peterson (2004)
- 370 Russell (2003)
- 371 Peterson (2004)
- 372 Peterson (2004)
- 373 Schofield (2003, p.150)
- 374 Anderson (2004)
- 375 Anderson (2004)
- 376 Schofield (2003)
- 377 ANTA (2004d)
- 378 Anderson (2003b)
- 379 Plas (2003)
- 380 See: <http://www.ncsustainability.com.au/PDKit>
- 381 Curtis and McKenzie (2001)
- 382 Wheelahan (2004)
- 383 Anderson (2003b)
- 384 Anderson (2003a,b)
- 385 See: <http://www.corporate-responsibility.com.au>
- 386 See: <http://www.globalreporting.org>

References

- AccountAbility (2004) *Welcome to AccountAbility*. Available at: <http://www.accountability.org.uk/> [Accessed 10 September 2004].
- ACTS Team (undated) *Action research for Change Towards Sustainability: Change in Curricula and Graduate Skills towards Sustainability*. Sydney: University.
- Alabaster, T. and Blair, D. (1996) *Education for Sustainability: Corporate Greening in UK Universities and Colleges*. London: Earthscan/WWTU.
- Ali Khan, S. (1996) 'A vision of a 21st century community learning centre' in Huckle, J. and Sterling, S. (eds) *Education for Sustainability*. London: Earthscan Publications Ltd.
- Anderson, D. (2003a) 'Productivism, VET and ecological sustainability', Paper presented to 'The Changing Face of VET', 6th Annual Conference, Australian VET Research Association, Australian Technology Park Conference Centre, Sydney, 9-11 April. Available at: http://www.avetra.org.au/Conference_Archives/2003/documents/PA066Anderson.pdf [Accessed 10 January 2005].
- Anderson, D. (2003b) 'From productivism to ecologism: Dilemmas, issues and strategies for VET', *Australian Vocational Education Review*, 17(1), 1-4.
- Anderson, D. (2004) 'Spotlight for choice? Individuals, VET markets and lifelong learning', Paper presented at Australian VET Research Association Conference *Learner and Practitioner – the Heart of the Matter*, Canberra: March 17th – 19th 2004. Available at: http://www.avetra.org.au/Conference_Archives/2004/documents/PA062Anderson.pdf [Accessed 10 January 2005].
- Anderson, D., Brown, M. and Rushbrook, P. (2004) 'Vocational Education and Training' in Foley, G. (ed) *Dimensions of Adult Learning: Adult Education and Training in the Global Era*. Sydney: Allen & Unwin.
- Argyris, C. and Schon, D. A. (1996) *Organisational Learning II: Theory, Method and Practice*. Massachusetts: Addison-Wesley Publishing Company.
- Asset.gov (2004) *Projects and Community Consultation*. Available at: <http://www.asset.gov.com.au> [Accessed 10 September 2004].
- Australian Building Greenhouse Rating (2004) *Can your building rise above the competition?* Available at: <http://www.abgr.com.au> [Accessed 10 September 2004].
- Australian Bureau of Statistics (2003) *Education and Work Survey*. Available at: <http://www.abs.gov.au/ausstats/abs@/nsf/lookupMI/09F494FB1EA20EC8CA256BD00026A755#Links> [Accessed 28 October 2004].
- Australian Campuses Towards Sustainability (ACTS) (2004a) *Australian Campuses towards Sustainability*. Available at: <http://www.acts.unsw.edu.au/index.htm> [Accessed 6 August 2004].
- Australian Campuses Towards Sustainability (ACTS) (2004b) *Australian Ecological Development Charter*. Available at: <http://www.acts.unsw.edu.au/links.htm> [Accessed 27 October 2004].
- Australian Chamber of Commerce and Industry, Australian National Training Authority, Business Council of Australia and Australian Government Department of Education Science and Training (2002) *Employability Skills for the Future*. Canberra: Australian Government.
- Australian Council of Trade Unions (undated) *The Future of Work Conference*. Available <http://www.actu.asn.au/public/futurework/> [Accessed 10 January 2005].
- Australian Greenhouse Office (2004) *Greenhouse Challenge Program*. Available at: <http://www.greenhouse.gov.au/challenge/index.html> [Accessed 27 October 2004].
- Australian National Training Authority (ANTA) (2003) *Training for the future: A collaboration with industry*. ANTA Position Paper. Available at: <http://www.anta.gov.au/> [Accessed 19 July 2004].
- Australian National Training Authority (ANTA) (2004a) *Shaping our Future: Australia's National Strategy for Vocational Education and Training, 2004-2010*. Sydney: ANTA.
- Australian National Training Authority (ANTA) (2004b) *National Industry Skills Report – Sydney 15 April 2004*. Sydney: ANTA.

- Australian National Training Authority (ANTA) (2004c) *High Level Review of Training Packages: It's happened. What now?* Available at: <http://www.anta.gov.au/publication.asp?qsID=625> [Accessed 6 September 2004].
- Australian National Training Authority (ANTA) (2004d) *Moving on... Report of the High Level Review of Training Packages*. Available at: <http://www.anta.gov.au/publication.asp?qsID=624> [Accessed 6 September 2004].
- Australian National Training Authority (ANTA) (2004e) *ABC of VET – Vocational education and training in schools*. Available at: <http://www.anta.gov.au/publication.asp?qsID=20> [Accessed 6 September 2004].
- Australian National University (ANU) (2001) *ANU Green Office Environmental Review*. Available at: <http://www.anu.edu.au/facilities/anugreen/EMPC/2001GOPReport.pdf> [Accessed 13 September 2004].
- Australian National University (ANU) (2004a) *Ecologically Sustainable Design-Planning and Construction Standards*. Available at: http://www.anu.edu.au/facilities/anugreen/esd/policies/esd_standards.html [Accessed 6 August 2004].
- Australian National University (ANU) (2004b) *Energy and Greenhouse Emission Management*. Available at: <http://www.anu.edu.au/facilities/anugreen/admin/energy.html> [Accessed 9 September 2004].
- Australian National University (ANU) (2004c) *Interhall Environmental Working Group*. Available at: <http://www.anu.edu.au/facilities/anugreen/halls.html> [Accessed 19 September 2004].
- Australian National University (ANU) (2004d) *Recycling and Waste Management*. Available at: <http://www.anu.edu.au/facilities/anugreen/admin/plan/waste.html> [Accessed 9 September 2004].
- Australian National University (ANU) (2004e) *Stormwater Management*. Available at: <http://www.anu.edu.au/facilities/anugreen/stormwater.html> [Accessed 19 September 2004].
- Australian National University (ANU) (2004f) *The Challenge*. Available at: <http://www.anu.edu.au/facilities/anugreen/office/challenge.html> [Accessed 9 September 2004].
- Australian National University (ANU) (2004g) *ANU green*. Available at: http://www.anu.edu.au/facilities/anugreen/admin/tallories_implementation.html [Accessed 8 March 2004].
- Australian National University (ANU) (2004h) *Green Office Program*. Available at: <http://www.anu.edu.au/facilities/anugreen/office/challenge.html> [Accessed 27 October 2004].
- Australian National University (ANU) (2004i) *Green Steps Student Training and Industry Placements*. Available at: <http://www.anu.edu.au/nie/programs/greensteps/> [Accessed 9 September 2004].
- Australian National University (ANU) (2004j) *Transport*. Available at: <http://www.anu.edu.au/facilities/anugreen/admin/plan/transport.html> [Accessed 29 October 2004].
- Australian Universities Qualities Agency (AUQA) (2004) *About AUQA*. Available at: <http://www.auqa.edu.au/> [Accessed 27 October 2004].
- Bateson, G. (1999) *Steps to an Ecological Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology*. Chicago: University of Chicago Press.
- Bekessy, S., Burgman, M., Wright, T., Leal Filho, W. and Smith, M. (2004) *Universities and Sustainability*. Melbourne: Australian Conservation Foundation.
- Bekessy, S.A., Burgman, M.A., Yencken, D., Wright, T., Leal Filho, W., Garden, D. and Rostan-Herbert, D. (undated) *A Summary of Environmental Practices in Australian Universities*. Available at: <http://www.mei.monash.edu.au/conference/Papers/bekessy-et-al.pdf> [Accessed 9 September 2004].
- Berrill, I. and Giffard, S. (2001) 'Training designers and installers of stand alone power systems - a holistic approach for a sustainable future' Paper presented to *Women Leaders on the Uptake of Renewable Energy Seminar*. Perth: June 2001.
- Bowden, J., Hart, G., King, B., Trigwell, K. and Watts, O. (2001) 'Generic capabilities of ATN university graduates', as quoted in Dawe (2004).

- Bubna-Litic, D. (2004) *Responsible Business – Subject Outline*. Sydney: UTS.
- Business Council of Australia (undated) *The Vocational Education and Training System: Key issues for large enterprises*. A report prepared for the Council of Australia by The Allen Consulting Group.
- Business Council of Australia (2004) *BCA Australian Scenario Project*. Available at: <http://www.bca.com.au/content.asp?newsid=91262> [Accessed 20 October 2004].
- Calvo Roy, S., Benayas, J. and Gutierrez, J.P. (2002) 'Learning in sustainable environments: The greening of higher education' in Tilbury, D., Steyer, J., Schreuder, D., (eds) *Education and Sustainability: Responding to the Global Challenge*. Gland: IUCN Commission on Education and Communication.
- Carpenter, D. and Meehan, B. (2002) 'Mainstreaming environmental management: Case studies from Australasian universities', *International Sustainability in Higher Education*, 3 (1): 19-37.
- Centre for Ecosystem Management (2003) *A case study of waste management practices of a large Australian University*. Available at: http://www.au/chs/cem/research/other_research/ecurecycle/wme.htm [Accessed 9 September 2004].
- Chappell, C. and Hawke, G. (2003) *An industry-led VET system: Issues for policy, practice and practitioners*. OVAL Research UTS Working Paper RP127. Available at: http://www.oval.uts.edu.au/working_papers/2003WP/0307chappell.pdf [Accessed 27 October 2004].
- Clugston, R. and Calder, W. (1999) 'Critical Dimensions of Sustainability in Higher Education' in Filho, W.L. (ed) *Sustainability and Universities*. New York: Peter Lang Publishers.
- Clugston, R. and Calder, W. (2002) 'The world summit on sustainable development and higher education for sustainable development', *International Association of Universities*, 8 (4): 1-8.
- Construction Innovation (2004) *Building our Future*. Available at: <http://www.construction-innovation.info/> [Accessed 10 September 2004].
- Copernicus (1994) *University Charter*. Available at: http://www.copernicuscampus.org/sites/charter_index1.html [Accessed 27 October 2004].
- Corcoran, P. B., Calder, W. and Clugston, R. (2002) 'Sustainability and higher education: Initiatives and agendas', *Higher Education Policy Spectrum*, 1 (2): 1-10.
- Corcoran, P. B. and Wals, A. E.J. (2004) *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice*. Dordrecht: Kluwer Academic Publishers.
- Cortese, A. D. (1992) 'Education for an environmentally sustainable future', *Environmental Science and Technology*, 26 (6): 1108-1114.
- Cortese, A. D. (1999) *Education for Sustainability: The University as a Model of Sustainability*. Boston: Second Nature.
- Creighton, S. H. (1998) *Greening the Ivory Tower. Improving the Environmental Track Record of Universities, Colleges and Other Institutions*. Massachusetts: Achorn Graphic Services, Inc.
- CSIRO (2004) *Energy Express*. Available at: <http://www.csiro.au/index.asp?type=activity&cid=EnergyExpress&stylesheet=aboutCSIROActivity> [Accessed 27 October 2004].
- Curtin, P. (2004) 'Employability skills for the future' in Gibb, J. (ed.) *Generic Skills in Vocational Education and Training: Research readings*. Adelaide: National Centre for Vocational Education Research (NCVER).
- Curtis, D. (2004) 'International perspectives on generic skills' in Gibb, J. (ed) *Generic Skills in Vocational Education and Training: Research readings*. Adelaide: National Centre for Vocational Education Research (NCVER).
- Curtis, D. and McKenzie, P. (2001) 'Employability Skills for Australian Industry: Literature Review and Framework Development'. Australian Council for Educational Research (ACER). Report to Business Council of Australia and Australian Chamber of Commerce and Industry.
- Dawe, S. (2004) 'Developing generic skills in training packages' in Gibb, J. (ed) *Generic Skills in Vocational Education and Training: Research readings*. Adelaide: National Centre for Vocational Education Research (NCVER).

- De C. (1997) Senge, P. (1997) *The Living Company*. Massachusetts: Harvard Business Press. Department of Education, Science and Training (DEST) *DEST Annual Report 2002-2003*. Available at: <http://www.dest.gov.au/annualreport/2003/app6.htm> [Accessed 28 October 2004].
- Dep. of Education, Science and Training (DEST) (2004b) *National Research Priorities*. Available at: <http://www.dest.gov.au/priorities/default.htm>
- Dep. of Education, Science and Training (DEST) (2004c) *Higher Education*. Available at: <http://www.dest.gov.au/highered/index1.htm> [Accessed 27 October 2004].
- Defra (2004) Environment, Food and Rural Affairs (2004) *Sustainable Development Education Panel*. UK Government. Available at: <http://www.defra.gov.uk/environment/sustainable/educpanel/> [Accessed 27 October 2004].
- Dept. of the Environment and Heritage (1992) *National Strategy for Ecologically Sustainable Development*. Canberra: Australian Government
- Dept. of the Environment and Heritage (1999) *Today Shapes Tomorrow: Environmental education for a Sustainable Future: A Discussion Paper*. Available at: <http://www.deh.gov.au/education/publications/discpaper/index.html> [Accessed 27 October 2004].
- Dept. of the Environment and Heritage (2000) *Environmental Education for a Sustainable Future: National Action Plan*. Canberra: Australian Government.
- Dept. of the Environment and Heritage (2001) *Summit calls for better environmental education*. Available at: <http://www.deh.gov.au/education/nap/annu-release.html> [Accessed 27 October 2004].
- Dept. of the Environment and Heritage (2004) *National Australian Built Environment Rating System Project*. Available at: <http://www.deh.gov.au/industry/construction/nabers/> [Accessed 27 October 2004].
- Dip. (1998) 'The ethic of sustainability for work education', *Journal of Vocational Education Research*, 23 (4): 325-338.
- Dor, B. (2003) *Leading Change Towards Sustainability*. Sheffield: Greenleaf Publishing.
- Dow (2001) *Institutions for Sustainability*. Melbourne: Australian Conservation Foundation.
- Dow, R. (2004) 'Sustainability takes time', *International Journal of Sustainability in Higher Education*, 5 (1): 81-90.
- Dunlop, D., Griffiths, A. & Benn, S. (2003) *Organizational Change for Corporate Sustainability*. Routledge: London.
- Ecospecifier (2004) *Ecospecifier, the eco-products knowledgebase*. Available at: <http://www.ecospecifier.org> [Accessed 10 September 2004].
- EEQSBA (2004) *National Curriculum*. Available at: <http://www.eeqsba.com.au/resources/misc/2013.pdf> [Accessed 7 September 2004].
- Energy and Technical Services (2004) *E-Bench*. Available at: <http://www.energyts.com/> [Accessed 27 October 2004]
- Environment Australia (2000) *Environmental Education for a Sustainable Future: National Action Plan*. Canberra: Environment Australia.
- Environmental Protection Agency, Victoria (2004) *The Eco-Footprint Calculator: Measuring our impact on the environment*. Available at: <http://www.epa.vic.gov.au/eco-footprint/calculator.asp> [Accessed 29 October 2004].
- Faculty of the Built Environment (FBE), University of New South Wales (UNSW) (2004) *Launch of the National Sustainable Universities Campaign*. Available at: <http://www.fbe.unsw.edu.au/news/2001/SustUni/> [Accessed 27 October 2004]
- Ferrier, E. (2001) 'Can VET meet the skill needs of new industries?: Case studies of two "green" industries', in Beven, F., Kanes, C. and Roebuck, D. (eds) *Knowledge demands for the new economy: Proceedings of the 9th Annual International Conference on Post-Compulsory Education and Training*. Brisbane: Australian Academic Press. 1: 223-230.
- Fien, J. (1993) *Environmental Education: A Pathway to Sustainability*. Geelong: Deakin University.
- Fien, J. (2004) *Orienting TVET for Sustainable Development: An UNESCO Initiative*. Report to the National Environmental Education Network, Further and Higher Education Working Group, 30th August.

- Fien, J. Heck, D. and Ferreira, J. (1997) *Learning for a Sustainable Environment: A Professional Development Guide for Teachers*. Brisbane: Griffith University.
- Fien, J. and Tilbury, D. (1996) *Learning for a Sustainable Environment: An agenda for Asia and the Pacific*. Bangkok: UNESCO.
- Filho, W. (2002) *Teaching Sustainability at Universities: Toward Curriculum Greening*. Berlin: Peter Lang Publishing.
- Forum for the Future (1999) *Learning for Life: Higher Education and Sustainable Development*. London: Forum for the Future.
- Geli de Ciurana, A. M. (2001) *Education for Sustainability in University Studies*. Girona: University of Girona.
- Gibb, J. and Curtin, P. (2004) 'Overview', in Gibb, J. (ed) *Generic Skills in Vocational Education and Training: Research readings*. Adelaide: National Centre for Vocational Education Research (NCVER).
- Global Higher Education Partnership for Sustainability (GHEPS) (2001) *The Luneburg Declaration*. Available at: <http://www.lueneburg.de/de/downloads/declaration.htm> [Accessed 27 October 2004]
- Global Reporting Initiative (2004) *A Common Framework for Sustainability Reporting*. Available at: <http://www.globalreporting.org> [Accessed 10 September 2004].
- Goozee, G. (2001) *The Development of TAFE in Australia*. Adelaide: National Centre for Vocational Education Research (NCVER).
- Government of Victoria (2005) *Our Environment, Our Future: Victorias environmental sustainability framework*, Melbourne: Department of Sustainability and Environment, Victorian Government
- Government of Western Australia (2003a) *Hope for the Future*. Available at: <http://www.sustainability.dpc.wa.gov.au/docs/Final%20Strategy%20for%20the%20Future.pdf> [Accessed 27 October 2004].
- Government of Western Australia (2003b) *International Sustainability Conference Western Australia September 17-19 2003*. Available at: <http://www.sustainability.dpc.wa.gov.au/conferences/keynotes/Rees%20media%20statement.pdf> [Accessed 9 September 2003].
- Green Building Council Australia (2004) *Building Programs*. Available at: www.gbcaus.org [Accessed 10 September 2004].
- Green Globe 21 (2004) *About Green Globe 21*. Available at: <http://www.greenglobe21.com/> [Accessed 27 October 2004].
- Gudz, N. (2004) 'Implementing the sustainable development policy at the University of British Columbia', *International Journal of Sustainability in Higher Education*. 5 (2).
- Hart, A. (2001) *Inaugural National Conference of Sustainable Campuses, UTS-Sydney 2001*. Available at: <http://www.sustainability.uts.edu.au/susconftrimerable.html> [Accessed 13 September 2004].
- Harvard Gazette (2003) *Making Institutions Greener*. Harvard: Harvard News Office.
- Hesselink, F., van Kempen, P.P, Wals, A. (2000) *ESDebate International debate on education for sustainable development*. Gland: IUCN
- Hicks, D. and Holden, C. (1995) *Visions of the Future*. England: Trentham Books Limited.
- Higher Education for the 21st Century (1999) *Learning for Life*. London: Forum for the Future.
- Holt, D. (2003) 'The role and impact of the business school curriculum in shaping environmental education at Middlesex University', *International Journal of Sustainability in Higher Education*. 4 (4): 324-343.
- Howard, J. Mitchell, D., Spennemann, D. and Webster-Mannison, M. (2000) 'Is today shaping tomorrow for tertiary education in Australia', *International Journal of Sustainability in Higher Education*. 1 (1): 83-96.
- Huckle, J. (1996) 'Realizing Sustainability in Changing Times' in Huckle, J. and Sterling, S. (eds) *Education for Sustainability*. London: Earthscan Publications Ltd

- Huckle, P. (2003) 'Critical Realism: A Philosophical Framework for Higher Education for Sustainability' in Corcoran, P. B. and Wals, A.E.J. (eds) *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice*. Dordrecht: Kluwer Academic Publishers.
- Huckle, P. (2004) 'Education for Sustainability: A Realist Perspective' in Wals, A.E.J. (ed) *Handbook of Sustainable Education*. London: Earthscan Publications Ltd.
- International Association of Universities (IAU) (1991) *The Halifax Declaration*. Available at: <http://www.unesco.org/iau/sd/halifax.html> [Accessed 27 October 2004].
- International Association of Universities (IAU) (1993a) *The Kyoto Declaration*. Available at: <http://www.unesco.org/iau/sd/position.html#Draft%20Action%20for%20Individual> [Accessed 27 October 2004]
- International Association of Universities (IAU) (1993b) *The Swansea Declaration*. Available at: [http://www/unesco.org/iau/sd/swansea.html](http://www.unesco.org/iau/sd/swansea.html) [Accessed 27 October 2004].
- International Union for Conservation of Nature and Natural Resources (IUCN) (2002) *Statement submitted to UNESCO Education Working Group*. Gland: IUCN. Unpublished.
- Jolly, M. (2004) 'Employability Skills: Balancing the equation' in Gibb, J. (ed) *Generic Skills in Vocational Education and Training. Research readings*. London: National Centre for Vocational Education Research (NCVER).
- Kemmis, S. and McTaggart, R. (1988) *The Action Research Planner*. Victoria: Deakin University Press.
- Kent, D. (2004) 'How can the VET sector drive the adoption of sustainable practices in industry?' Paper presented at Linking Research and Practice Conference, *Effective Sustainability Education: What Works? Why? Where Next?* Sydney: February 18th - 20th 2004.
- Korten, D. and Senge, P.M. (1995) 'Communities of Commitment: the heart of learning organisations' in Chawla, S. and Renesch, J. (eds) *Learning to Sustain*. Portland: Productivity Press: 15-43.
- Learning and Skills Development Agency (2002) *Learning to Last: Skills sustainability and strategy*. London: LSDA
- Learning and Skills Development Agency (2004) *Good Practice in Sustainable Development Education*. Available at: <http://www.lsda.org.uk/sustainable/asp?section=2> [Accessed 27 October 2004].
- Lenzen, M. and Murray, S. A. (2003) *The Ecological Footprint - Issues and Trends*. Sydney: University of Sydney
- Levy, P. and Greenwood, D. (2001) 'Pragmatic Action Research and the Struggle to Transform Universities into Learning Communities' in Reason, P. and Bradbury, H. (eds) *Handbook of Action Research*. London: Sage Publications: 103-113.
- Learning and Skills Development Agency (undated) *Sustainability Development Education*. Available at: <http://www.lsda.org.uk/programmes/sustainable/> [Accessed 1 July 2004].
- LISA (2004) *LCA in Sustainable Architecture*. Available at: <http://www.lisa.au.com/> [Accessed 10 September 2004].
- Lloyd, C. and Payne, J. (2002) 'Developing a political economy of skill', *Journal of Education and Work*. 15 (4).
- London South Bank University (1992) *Education for Sustainability*. Available at: <http://www.lsbu.ac.uk/efs/prospectus/index.shtml> [Accessed 9 August 2004].
- Lotz-Sisitka, H. (2003) EEASA and the emerging field of environmental education in southern Africa: Towards participation in the UN Decade for Sustainable Development. *Keynote address presented at the EEASA 21 Conference*, 23-25 June 2003.
- Lotz-Sisitka, H. (2004a) 'Positioning Southern African Environmental Education in a Snagging Political, Economic, Social, Natural and Epistemological (environmental) Landscape.' A discussion paper commissioned by the SADC REEP
- Lotz-Sisitka, H. (2004b) 'Stories of transformation', *International Journal of Sustainability in Higher Education*. 5 (1): 8-10.

- McCutcheon, S. (1997) *Transformative Learning: Applications for the development of learning organisations*. Available at: <http://www.anrecs.nsw.gov.au/research/mccut.htm> [Accessed 29 October 2004].
- Melbourne University (2004) *Green Office Program*. Available at: http://www.unimelb.edu.au/rmo/env_man/gop/ [Accessed 27 October 2004].
- Mezirow, J. (2000) *Learning as Transformation: Critical Perspective on a Theory in Progress*. New York: Jossey Bass.
- Monash Environment Institute (2004) *The Green Steps Program*. Available at: http://www.mei.monash.edu.au/GS_training.html [Accessed 27 October 2004].
- Monash University (2001) *Green Steps*. Available at: http://www.mei.monash.edu.au/GS_training.html [Accessed 9 September 2004].
- Monash University (2004a) *Green Purchasing Committee*. Available at: <http://www.adm.monash.edu.au/ohse/environment/green-purchasing/> [Accessed 27 October 2004].
- Monash University (2004b) *Monash Green Office Program*. Available at: http://www.adm.monash.edu.au/ohse/environment/greenoffice_program/ [Accessed 9 September 2004].
- Monash University (2004c) *The Monash Environment Institute Green Steps Program: Mobilizing students towards better environmental performance*. Available at: http://www.anu.edu.au/acts2003/papers/abstracts/symons_bacher.pdf [Accessed 13 September 2004].
- Monash University (2004d) *The Role of Knowledge Transfer in Implementing and Applying B2B E-Commerce: Australian empirical evidence in a business management context*. Available at: <http://eprint.monash.edu.au/archive/00000011/01/wp31-02.pdf> [Accessed 9 September 2003].
- National Centre for Sustainability, Swinburne University of Technology (undated) *Sustainability and Education*. Available at: <http://www.ncsustainability.com.au/PDkit> [Accessed 22 December 2004].
- National Centre for Sustainability, Swinburne University of Technology (2003) *Conservation and Land Management Support Guide*. Available at: <http://www.ncsustainability.com.au/?id=partnerships> [Accessed 26 October 2004].
- National Training Information Service (NTIS) *National Training Information Service*. Available at: <http://www.ntis.gov.au> [Accessed 26 October 2004].
- National Union of Students (undated) *General Principles*. Available at: http://www.unistudent.com.au/about/files/ENVIRONMENTAL_docs.pdf [Accessed 13 September 2004].
- NCFE (2004) *Environment and Sustainable Development*. Available at: <http://www.ncfe.org.uk/app/publicschemes/> [Accessed 21 July 2004].
- Nixon, A. (2002) *Improving the Campus Sustainability Assessment Process*. Available at: <http://www.ulst.org/nixon/contents.htm> [Accessed 28 October 2004].
- NSW Environment Protection Authority and Primary Industries and Natural Resources Division, TAFE NSW (2003) *Environmental Responsibility: Teacher and Learner Resources*. Available at: <http://esd.tafensw.edu.au/2388/2441/default.htm#TAFE1%20Resources> [Accessed 26th October 2004].
- NSW Government (2002) *Learning for Sustainability. NSW FE Plan 2002-2005*. Sydney: NSW Council for Environmental Education.
- Organisation for Economic Co-operation and Development (OECD) (1991) *Environment, Schools and Active Learning*. Paris: Centre for Educational Research and Innovation.
- Organisation for Economic Co-operation and Development (OECD) (2004) *Definition and Selection of Competencies*. Available at: <http://www.portal-stat.admin.ch/deseco/index.htm> [Accessed 27 October 2004].
- Orr, D. W. (1992) *Ecological Literacy: Education and the Transition to a Postmodern World*. New York: SUNY Press.
- Orr, D. W. (1994) *Earth in Mind: On Education, Environment and the Human*. Washington: Island Press.
- Orr, D. W. (2002) *The Nature of Design*. New York: Oxford University Press.
- Parliamentary Commissioner for the Environment (PCE) (2004) *See Change: Learning and education for sustainability*. Wellington, New Zealand: PCE.

- Peter, J. (2004) 'Environmental technician training in the VET sector; research and directions' Paper presented at Linking Research and Practice conference, *Effective Sustainability Education: What Works? Why? Where Next?* Sydney: February 18th - 20th 2004.
- Pitt, R. (2004) 'Living Sustainability through Higher Education: A whole system approach to organizational change', in Corcoran P. B. and Wals, A. E. *Higher Education and the Challenge of Sustainability*. Dordrecht: Kluwer Academic Publishers.
- Plavins, J. (2003) *Aligning your Teaching with the Principles of Sustainability*. National Centre for Sustainability, Swinburne University. Available at: <http://sustainability.com.au/?id=partnerships> [Accessed 6 September 2004].
- Prologics Consultants (2004) *SimaPro LCA Software the tool for professionals*. Available at: <http://www.pre.nl/simapro/default.htm> [Accessed 10 September 2004].
- Reinventing the Future (2004) *Staff Development and Change Management Programs to Support the National Training System*. Available at: <http://www.reinventingthefuture.net/> [Accessed 27 October 2004].
- Reynolds, J. V., Lotz Sisitka, H. and Mosidi, S. (2001) *Environmental Learning Across NQF*. South Africa: Department of Environmental Affairs and Tourism.
- Roby, D. (1995) *Taking Responsibility Sport, Leisure, Hospitality and Tourism*. London: Pluto Press.
- Roby, D. (2003) 'Employment Opportunities and Needs for the Future' notes for the presentation at the *Skilling Australia Forum*, Gold Coast, 10th - 11th September 2003.
- Roby, D., Anayas, J. and Gutierrez Perez, J. (2002) 'Learning in Sustainable Environments. The greening of higher education', in Tilbury, D., Stevenson, J. and Schreuder, D. (eds) *Education and Sustainability Responding to the Global Challenge*. Switzerland: Cambridge UK.
- Rodriguez and Associates Pty Ltd (2003) *Think piece on the Training Package Model*. Available at: http://www.anta.gov.au/download/FP_model_piece.pdf [Accessed 19 July 2004].
- Rodriguez, J. (2003) *Environmental Content in Vocational Education and Training*. IAFE NSW. Available at: <http://ig.tafensw.edu.au/enviro/> [Accessed 7 September 2004].
- Rodriguez, J. and Salganik, L. H. (2000) *Definition and selection of key competencies*. Report to the INES General Assembly, Neuchatel, Switzerland: OECD.
- Sat Global (2004) *Shopping of standards*. Available at: <http://www.standards.com.au> [Accessed 10 September 2004].
- Schell, J. K. (2003) *Lifelong Learning: Proceedings of a Symposium*. Melbourne: Monash University-ACER, Centre for the Economics of Education and Training (CEET).
- Science Council of Japan (2002) *Ubuntu Declaration*. Available at: <http://www.scj.go.jp/en/sca/data/ubuntu.html> [Accessed 27 October 2004].
- Senge, P. (1990) *The Fifth Discipline: The art and practice of the learning organization*. New York: Doubleday/Currency.
- Senge, P. (1999) *The Dance of Change: The Challenges to Sustaining Momentum in Learning Organizations*. Available at: <http://team-building.argospress.com/book-0385493223.htm> [Accessed 13 September 2004].
- Senge, P., Kleiner, A., Roberts, C., Ross, R., Roth, G. and Smith, B. (2004) *The Dance of Change: The Challenges of Sustaining Momentum in Learning Organizations*. New York: Doubleday.
- Sharp, L. (2002) 'Green campuses: the road from little victories to systemic transformations', *International Journal of Sustainability in Higher Education* 3 (2): 128-145.
- Sterling, S. (1996) 'Education in Change' in: Huckle, J. & Sterling S. (eds.) *Education for Sustainability*. London: Earthscan Publications.
- Sterling, S. (2001) *Sustainable Education: Re-visioning learning and change*. London: Greenbooks.

- Sterling, S. (2004) 'Higher Education, Sustainability, and the Role of Systemic Learning', in Corcoran P.B. and Wals, A.F.J. (eds) *Higher Education and the Challenge of Sustainability*, London: Kluwer Academic Publishers.
- Stroud, J. D. (2001) *Australia's Urban Water Management*. Available at: http://www.aph.gov.au/senate/committee/ecita_ctte/water/submissions [Accessed 9 September 2004].
- Students At Macquarie (SAM) (2003) *SAM Initiative for Sustainability*. unpublished.
- Sustainable Development Education Panel (2002a) *Learning to Last: Business and Sustainable Development - a Learning Guide for Sector Skills*. UK Government Department for Environment, Food and Rural Affairs. Available at: <http://www.defra.gov.uk/environment/sustainable/education/learnguide/index.htm> [Accessed 7 September 2004].
- Sustainable Development Education Panel (2002b) *Learning to Last: Sustainable Development through Education - a Learning Guide for professional skills*. UK Government Department for Environment, Food and Rural Affairs. Available at: <http://www.defra.gov.uk/environment/sustainable/education/learnguide/index.htm> [Accessed 7 September 2004].
- Sustainable Development Education Panel (2002c) *Learning to Last: Sustainable Development through Education - a Learning Guide for Trade Skills*. UK Government Department for Environment, Food and Rural Affairs Available at: <http://www.defra.gov.uk/environment/sustainable/education/learnguide/index.htm> [Accessed 17 February 2004].
- Technical and Further Education (TAFE) NSW (2000) *Curriculum Development for Environmental Education. A report of the Educational Services Division Environment Working Group*. Sydney: TAFE NSW.
- Tertiary Education Facilities Management Association (TEFMA) (2004a) *A Guide to Incorporating Sustainability into Facilities Management*. Available at: <http://www.tefma.com/PDFs/SustGuideDraft.pdf> [Accessed 9 September 2004].
- Tertiary Education Facilities Management Association (TEFMA) (2004b) *Building Sustainability Workshop*. Available at: <http://www.facilitiesaustralia.com.au/tefma/> [Accessed 9 September 2004].
- Thomas, I. (2004) 'Sustainability in tertiary curricula: what is stopping it happening?' *International Journal of Sustainability in Higher Education* 5 (1): 1-10.
- Thomas, I. and Nicita, J. (2002) 'Sustainability education and Australian universities', *Environmental Education Research*, 8 (4): 475-490.
- Tilbury, D. (1993) *Environmental Education: Developing a model for initial teacher education*. PhD Thesis, University of Cambridge.
- Tilbury, D. (1999) 'The Environmental Educators' Initiative for China - WWF-China' in Fien, J. (ed) *Education & Conservation: Case Study of Environmental Education in China*. Gland: WWF International & WWF-US.
- Tilbury, D. (2003) 'The summit, sustainable development and environmental education,' *Australian Journal of Environmental Education* 19 (1): 1-10.
- Tilbury, D. (2004) 'Environmental Education for Sustainability: A force for change in higher education', in Blaze Corcoran, P. and Wals, A.F.J. (eds) *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice*. Dordrecht: Kluwer Academic Press.
- Tilbury, D. and Cooke, K. (2001) *Building Capacity for a Sustainable Future*. Sydney: Macquarie University.
- Tilbury, D., Crawley, C. and Berry, F. (2005) *Education About and For Sustainability in Australian Business Schools*. Report prepared by Macquarie University and Arup Sustainability for the Australian Government Department of the Environment and Heritage.
- Tilbury, D., Podger, P., and Reid, A. (2004) *Action Research for Change Towards Sustainability: Change in curricula and graduate skills towards sustainability*. Final Report prepared for the Department of the Environment and Heritage and Macquarie University.
- Tilbury, D., Stevenson, R., Fien, J. and Schreuder, D. (2002) *Education and Sustainability: Responding to the global challenge*. IUCN Switzerland and Cambridge UK.
- United Nations (2002) *Plan of Implementation of the World Summit on Sustainable Development*. Available at: <http://www.johannesburgsummit.org/html/documents/undocs.html> [Accessed 18 February 2004].

- United Nations Conference on Environment and Development (UNCED) (1992) *Promoting education and public awareness and training: Agenda 21 issues*. UNCED.
- United Nations Educational Scientific and Cultural Organisation (UNESCO) (1999) *Final Report. Second International Conference on Technical and Vocational Education*. Paris: UNESCO.
- United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002a) *Education for Sustainability - From Rio to Johannesburg: Lessons learnt a decade of commitment*. Available at: http://portal.unesco.org/cn/ev.php-URL_ID=5202&URL_DO=DO_TOPIC&URL_SECTION=201. [Accessed 27 October 2004].
- United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002b) *Teaching and Learning for a Sustainable Future: A multimedia teacher education program*. Available at: <http://www.unesco.org/education/tlsf/> [Accessed 27 October].
- United Nations Educational Scientific and Cultural Organisation (UNESCO) (2004) *United Nations Decade of Education for Sustainable Development 2005-2014: Draft International Implementation Scheme*. Paris: UNESCO.
- United Nations Educational Scientific and Cultural Organisation (UNESCO) (2004) *Orienting TVET for Sustainable Development*. Discussion Paper prepared for the UNESCO International Experts Meeting, Bonn: October 28th 2004.
- United Nations Educational Scientific and Cultural Organisation (UNESCO) and International Labor Organization (ILO) (2002) *Technical and Vocational Education for the Twenty-First Century: ILO and UNESCO Recommendations*. Paris: UNESCO and Geneva: ILO.
- United Nations Educational Scientific and Cultural Organisation (UNESCO) - United Nations Europe Vocational Education (UNEVOC) (2004) 'Orienting TVET for Sustainable Development'. Special Issue for the UNESCO International Experts Meeting 'Learning for Work, Citizenship and Sustainability'. Bonn, Germany: 25-28 October 2004, *UNESCO-UNEVOC Bulletin*, no. 9, September. Available at: <http://www.unevoc.unesco.org/bulletin/index.htm> [Accessed 10 January 2005]
- United Nations University (UNU) (1990) *Talloires Declaration*. Available at: <http://www.ulsf.org/pdf/TD.pdf> [Accessed 27 October 2004]
- United Nations University (UNU) (2004) *GHFSP*. Available at: http://www.ulsf.org/toolkit/index2_eng.html [Accessed 27 October 2004]
- Wesley Mission (2004) *Trees in Newcastle* (2004). Available at: http://www.wesleymission.org.au/publications/green_c/treesinnewcastle.asp [Accessed 9 September 2004].
- University of New South Wales (UNSW) (1999) *Education for Sustainability*. Available at: <http://www.ies.unsw.edu.au/about/greeningUNSW/reeningCurriculum/education/EducationForSustainabilityTesting.pdf> [Accessed 10 September 2004].
- University of New South Wales (UNSW) (2000) *Environment Policy. Educational Response Working Party*. Available at: <http://www.ies.unsw.edu.au/Documents/EduEnviroPolicy.htm> [Accessed 9 September 2004].
- University of New South Wales (UNSW) (2003) *Green your Office*. Available at: <http://www.emp.unsw.edu.au/GOP/GreeningYourOffice/gyo.html> [Accessed 9 September 2004].
- University of New South Wales (UNSW) (2004a) *Sustainable Schools Challenge*. Available at: <http://www.sustainableliving.com.au/competition/info/awards2.shtml> [Accessed 9 September 2004].
- University of New South Wales (UNSW) (2004b) *Green Office Program*. Available at: <http://www.emp.unsw.edu.au/facilities/anugreen/office/challenge.html> [Accessed 27 October 2004].
- University of New South Wales (UNSW) (2004c) *UNSWitch*. Available at: <http://www.energy.unsw.edu.au/unswitch/> [Accessed 29 October 2004].
- University of New South Wales (UNSW) (2004d) *Sustainable Transport Program*. Available at: <http://notessrv.chan.unsw.edu.au/facilities/pages/transport?OpenDocument> [Accessed 29 October 2004].
- University of Technology, Sydney (UTS) (2001) *Inaugural National Conference Sustainable Campuses 26-28 September 2001*. Available at: <http://www.sustainability.uts.edu.au/events/susconfrecap.html> [Accessed 9 September 2004].

Glossary

● Action Learning

Action Learning is a process designed to build capacity using action, reflection and assessment. The improvement of practice is the ultimate goal. The process involves the participants developing an action plan, implementing it and reflecting on what they have learnt from it. A facilitator and/or mentor assists the participants in carrying out their plan and learning from their experiences. Increasingly, it is being used in group settings where a number of people come together to critically reflect upon their own knowledge and improve practice.

● Action Research

Action Research can be used as a collaborative research technique which is often represented as a four-phase cyclical process of critical enquiry - plan formation, action, outcome evaluation and reflection. It aims not just to improve, but to change practice.

Action Research provides a valuable process for exploring values in which sustainability is relevant to the researchers' lives and/or lifestyles. It views change as the desired outcome and involves participants as researchers of their own practice. In this way Action Research produces more than just a research document. It results in catalytic change for sustainability. Its focus on critical enquiry and continuous selfevaluation makes it a useful tool for professional development in Environmental Education. Critical Action Research aims to change systems and to embed change in practice.

● Agenda 21

Agenda 21, is an intergovernmental agreement signed at the United Nations Conference on Environment and Development held in Rio in 1992. This document consisting of 40 chapters provides an agenda for advancing sustainability. It was the first document to examine the interconnectedness of social, economic and environmental issues, focusing on current issues whilst also promoting and examination of future needs. Agenda 21 outlines objectives and actions that can be taken at local, national and international levels and provides a comprehensive blueprint for nations throughout the world who are starting to make the transition to sustainability. Chapter 36 of Agenda 21 accords special significance to the role of education as 'the most effective means that society possesses for confronting the challenges of the future'.²

● Community Education

Community Education programs are taken to refer to all education programs which fall outside of the school, further and higher education sectors.

● Corporate Social Responsibility (CSR)

Corporate Social Responsibility is the decision-making and implementation process that guides all company activities in the protection and promotion of international human rights, labour and environmental standards and compliance with legal requirements. CSR involves a commitment to contribute to the economic, environmental and social sustainability of communities through the on-going engagement of stakeholders, the active participation of communities impacted by company activities and the public reporting of company policies and performance in the economic, environmental and social arenas.

● 'Critical Theory'

'Critical theory' is a philosophical framework that seeks to radically critique systems of knowledge and power. 'Critical theory' seeks to develop systemic changes as opposed to individual behaviour changes. It emphasizes the importance of engaging people in thinking critically and developing their own responses and actions to issues rather than imposing on them previously constructed actions. 'Critical theory' attacks social practices, which obstructs social justice, human emancipation and ecological sustainability. 'Critical theory' is what underpins learning for sustainability approaches to Environmental Education. For further information see 'Critical Thinking'.

● 'Critical' Thinking

'Critical' Thinking is an essential part of learning for sustainability approaches to Environmental Education. It challenges us to examine the way we interpret the world and how our knowledge and opinions are shaped by those around us. 'Critical' thinking leads us to a deeper understanding of interests behind our communities and the influences of media and advertising in our lives. For further information refer to Volume 1 in this series.

● Ecological Footprint

Ecological footprints document a given individual's, population's or organisation's consumption and waste production. It is measured in terms of the area of biologically productive land and water required to

produce the goods consumed and to assimilate the wastes generated in a single year. The ecological footprint is a valuable resource for environmental educators because it provides a means to compare:

- various components of individual consumption;
- average consumption and impact patterns amongst countries/organisations; and
- individual and world average impacts.

• **Education *about* the Environment**

Education *about* the environment is the most commonly practiced approach in Environmental Education. It focuses on developing key knowledge and understanding about natural systems and complex environmental issues as well as developing an understanding of the human interaction with these systems and issues.

• **Education *in* the Environment**

Education *in* the environment is an approach, which provides opportunities for learners to have direct experience in the environment and develop positive attitudes and values towards stewardship of the environment. The approach may foster a value-based environmental concern of the importance and fragility of ecosystems and landscapes. While ecological concepts may be taught through these explorations, the focus is on having positive experiences in a natural setting.

• **Education *for* the Environment**

Education *for* the environment moves beyond education *in* and *about* the environment approaches to focus on equipping learners with the necessary skills to be able to take positive action. The education *for* the environment approach promotes critical reflection and has an overt agenda of social change. It aims to promote lifestyle changes that are more compatible with sustainability. It seeks to build capacity for active participation in decision-making for sustainability. In practice, however, education *for* the environment is often interpreted as the involvement of learners in one-off events or individual actions (e.g. tree planting) although occasionally they can trigger greater change on a social level.

• **Environmental Education for a Sustainable Future National Action Plan**

A national Australian strategy launched in 2000 that outlines a direction for Environmental Education in Australia. The aims to^b:

- increase the profile of Environmental Education;
- implement a national coordinating body for Environmental Education;
- provide professional development opportunities for teachers and others involved in Environmental Education;
- develop resources for Environmental Education; and
- integrate Environmental Education into mainstream education and training activities.

• **Envisioning and Futures Thinking**

Envisioning a better future is a process that engages people in conceiving and capturing a vision of their ideal future. Envisioning, also known as 'futures thinking', helps people to discover their possible and preferred future and to uncover the beliefs and assumptions that underpin these visions and choices. It helps learners establish a link between their long term goals and their immediate actions. Envisioning offers direction and energy and provides impetus for action by harnessing peoples' aspirations which motivate what people do in the present.

• **Learning for Sustainability**

Learning for sustainability has crystallized as a result of international agreements and the global call to actively pursue sustainable development. It provides a new orientation for current practice in Environmental Education. This new orientation attempts to move beyond education *in* and *about* the environment approaches to focus on equipping learners with the necessary skills to be able to take positive action to address a range of sustainability issues. Learning for sustainability motivates, equips and involves individuals, and social groups in reflecting on how we currently live and work, in making informed decisions and creating ways to work towards a more sustainable world. Underpinned by the principles of critical theory (see glossary). Learning for sustainability aims to go beyond individual behaviour change and seeks to engage and empower people to implement systemic changes. For further information refer to Volume 1 of this series.

- **Learning Organisation**

A learning organisation is one which is based on the principles of adaptive management and uses these techniques within the workplace. It promotes exchange of information between employees hence creating a knowledgeable workforce. This produces a very flexible organisation where people will accept and adapt to new ideas and changes through a shared vision. A key component of a learning organisation is that it incorporates the principles of adaptive management.

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. The most effective form ('active' adaptive management) employs management programs that are designed to explore visions, develop critical and systemic thinking in the workplace.

- **Lifecycle Analysis (LCA)**

Lifecycle Analysis is a technique for quantifying and comparing the inputs and outputs affecting environmental performance associated with a product throughout its lifecycle from production, through use, to disposal. It can assist in identifying opportunities to improve environmental performance.

- **Local Agenda 21**

Chapter 28 of the 'Agenda 21' document calls on local authorities to work with their local communities to develop a local action plan for sustainable development, or a 'Local Agenda 21.' This process recognises the role communities have to play in shaping their own future and the importance of building partnerships between local government, community, NGO and industry. Empowering local communities to participate actively in the decision making process is a core aim of Local Agenda 21 and seen as essential for the move towards sustainability. For further information refer to 'Agenda 21'.

- **National Environmental Education Council**

A key element of the Australian Government's National Action Plan for Environmental Education is the establishment of the *National Environmental Education Council*. The Council is a non-statutory body comprised of people from a variety of sectors who provide expert advice to the Government on Environmental Education issues. A key goal of the Council is to raise the profile of Environmental Education and, in particular, how Australians can move beyond environmental awareness to informed action⁶.

- **Sustainable Development and Sustainability**

The idea of sustainability owes a great deal to the United Nations which in 1983 set up the World Commission on *Environment and Development (WCED)* and promoted quality of life for present as well as future generations. The key goals of sustainability are to live within our environmental limits, to achieve social justice and to foster economic and social progress.

Issues such as food security, poverty, sustainable tourism, urban quality, women, fair trade, green consumerism, ecological public health and waste management as well as those of climatic change, deforestation, land degradation, desertification, depletion of natural resources and loss of biodiversity are primary concerns for both environmental and development education.

The issues underlying 'sustainable development', or 'sustainability', are complex and they cannot be encapsulated within the diplomatic language and compromises. Sustainability is open to different interpretations and takes on different meanings not only between cultures but also between different interest groups within societies. Sustainability embraces equality for all, and for this reason a key aim of sustainability is to enable multi-stakeholder groups to define their vision of sustainability and to work towards it. For further information refer to Volume 1 of this series.

- **Systems Thinking**

Systems thinking is a type of thinking methodology based upon a critical understanding of how complex systems, such as environments and ecosystems, function by considering the whole rather than the sum of the parts. Systems thinking provides an alternative to the dominant way of thinking, which emphasizes analysis and understanding through deconstruction. In comparison, systemic thinking offers a better way to understand and manage complex situations because it emphasizes holistic, integrative approaches, which take into account the relationships between system components and works toward long-term solutions critical to addressing issues of sustainability. Systemic thinking offers an innovative approach to looking at the world and the issues of sustainability in a broader, interdisciplinary and more relational way. Closely related to holistic and ecological thinking, systemic approaches help us shift our focus and attention from 'things' to processes, from static states to dynamics, and from 'parts' to 'wholes'.

• Triple Bottom Line (TBL)

Triple Bottom Line is an expanded baseline for measuring performance, adding social and environmental dimensions to the traditional monetary yardstick. Reporting on the TBL is based on the premise that by monitoring and reporting social, economic and environmental performance, organisations can better prepare for future challenges and opportunities, including those traditionally considered intangible, such as reputation.

• UN Decade of Education for Sustainable Development (UN Decade of ESD)

In December 2002, resolution 57/254 was adopted by the United Nations General Assembly establishing the *United Nations Decade of Education for Sustainable Development (2005-2014)*. The Decade is a culmination of the momentum towards sustainability generated by the *Earth Summit, 'Agenda 21'* and the *WSSD* and presents an opportunity to focus world attention on learning for sustainability across the globe.

The United Nations Decade of Education for Sustainable Development aims to:

- promote education as a prerequisite for the movement to sustainable human societies;
- integrate sustainable development into education systems at all levels; and
- strengthen international cooperation towards the development and sharing of innovative education for sustainable development theory, practice and policy.

The Decade also offers opportunities for researchers, practitioners and education policy-makers, who are often isolated from each other, to join in partnerships and to contribute to a collective and international imperative.

• Values Clarification

An educational approach employing a variety of strategies which enables learners to clarify and critically examine their own values, particularly those, which are unconscious or inarticulate. This process helps learners uncover how culture, ideology, gender, socio-economic background and religion shapes ones deepest held personal beliefs and values and assists learners in determining how ones own values coincide or conflict with others. Genuine engagement with sustainability requires us to understand how these factors shape our values and thus our view of the world.

^a UNESCO (1997) *Educating for a Sustainable Future*: a transdisciplinary vision for concerted action, para.38

^b Adapted from <http://www.deh.gov.au/education/nap/>

^c Adapted from <http://www.deh.gov.au/education/nap/council/>



We are grateful to those who have given
us permission to reproduce their images:

Arup Sustainability
Graduate School of the Environment,
Macquarie University

ISBN: 1 86408 996 2
Printed on recycled paper